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FIVE AND TEN YEAR ROADWAY AND TRANSIT IMPROVEMENT PROGRAM (1984 - 1993)

MAY 1983

THE CITY OF Edmonton TRANSPORTATION MANAGEMENT

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I INTRODUCTION

As part of the City's continuing review of transportation needs, the Transportation Management Department constantly monitors and updates improvements needed to maintain the efficient operation of the urban roadway and public transit infrastructure.

This report documents the urban growth that is estimated to occur in the City and its immediate environs over the next ten years and the changes in transportation demands that are anticipated. The transportation system planning for this time frame has been undertaken within the context of present council approved policies related to the evolution of a 'balanced' transportation system.

The definition of requirements is based on an analytical process which recognizes Edmonton's development in a regional context. As well, the process examines needs from an immediate as well as long range perspective. This ensures that facility proposals resolve individual problems and needs without comprising possible long term requirements.

The facility proposals cover three main areas:

Roadway Expansion

- road construction projects include those required to serve developing residential and industrial areas, and those to improve the operation of Edmonton Transit System's surface bus fleet.

Public Transportation

- these projects and capital improvements are required to reinforce policies which encourage the use of public transit.

Transportation Systems Management

- these include major projects to improve transit and vehicular movements on the transportation system through traffic control system changes, and intersection operational improvements.

II. THE EXISTING SYSTEM

A. Road Network

Figure 1 illustrates the major roadway network as it presently exists.

Table 1 summarizes the number of roadways within the City of Edmonton.

TABLE 1

LENGTHS OF ROADWAYS WITHIN EDMONTON (1982)

	LENGTH (KM)
Freeway	16
Expressway	50
Arterial	356
Collector	383
Local	1,547

There are presently 452 traffic signals that have been installed on City streets, of which over 64% are under the direct supervision of the central traffic control computer system.

In 1982 residents of the City generated 78,000 vehicle trips during the morning peak hour. 20% were oriented to the downtown area. The remainder were distributed to the suburban employment areas, as well as to activity centres within the Edmonton region.

B. Public Transit Network

The Edmonton Transit System features a surface fleet of 803 buses and trolleys on 113 routes. In addition 9.4 Km of LRT service supported by 17 LRT vehicles directly links the entire northeast area with the downtown. During peak periods the system can have as much as 78% of

its fleet in operation. The fleet is spread among 4 garages and one LRT depot which are strategically located throughout the City. During 1982 period the system carried an average of 27,000 trips during the peak hours.

Figure 2 illustrates the existing transit routes as well as major terminals and garage facilities.

III URBAN GROWTH

A. Population

During the 1970's the City experienced a period of very rapid growth. For the next decade, development is expected to continue, but at a reduced rate. Figure 3 shows past trends and projected growth that has been utilized in preparing this plan. City population projections were obtained from the Planning Department's growth projections for 1983 to 2000 for low, high and probable population levels. Future development is presented as a range because of the degree of uncertainty with respect to the amount of development within the region, as a whole. In the initial 5 year period, to 1988, the range between the high and low population projections is sufficiently small, that only one level has been used. In the second 5 year period, the range is very large such that analysis has been undertaken using both a 'high' and 'low' population level. Facility requirements for the ten year period outlined in this report have been determined on the basis of a 'high' growth rate to 1993, to represent a worst case scenario.

In addition to expected population growth within the City of Edmonton, a significant increase in population growth in the Edmonton region is also expected to occur. The growth outside Edmonton was estimated on the basis of the Edmonton Annexation decision, which maintains 75% of the regional population within the City of Edmonton. Population distribution within the region was determined by applying the proposed guidelines of the Regional Planning Commission.

Figure 4 and Table 2 illustrate the anticipated growth and distribution of residential development. This growth will be concentrated in suburban areas in all quadrants, with the distribution of population increases generally following the 1976 - 1982 trend. Within the older developed areas of the City, populations are generally stabilizing, or experiencing only slight variations.

Initial distributions of population within the City of Edmonton made use of Planning Department Projections. These were modified on the basis of current development trends, ease of development, and overall holding capacities. All population growth was assigned to areas within the R.D.A., with two exceptions. Due to employment growth adjacent to Highway 16 west and Highway 2 south, it was assumed that residential development in both Lewis Farms and Daon 80 would begin in the 1989 - 1993 time period.

TABLE 2

ESTIMATED POPULATION DISTRIBUTION

	POPULATION		
	1982 (Census)	1988	1993 (High)
Northeast	123,700	136,000	160,600
Southeast	112,300	133,500	171,200
South	90,300	106,400	125,700
Southwest	100,100	103,100	121,700
Northwest	70,600	77,400	91,600
Central	54,700	56,200	59,700
St. Albert - M.D. Sturgeon	50,000	64,400	75,400
Strathcona	60,800	77,300	102,000
Leduc	20,200	29,100	36,200
Parkland	26,400	34,200	41,200
TOTAL CITY	551,700	612,600	730,500
	(78%)	(75%)	(74%)
SURROUNDING AREAS	157,400	205,000	254,800
	(22%)	(25%)	(26%)
TOTAL	709,100	817,600	985,300

Outside the City of Edmonton, the majority of population growth was assigned to existing major urban centers (i.e., St. Albert, Sherwood Park, Fort Saskatchewan, Leduc, Spruce Grove and Stony Plain).

A breakdown of assigned population increases, by area, is included in Appendix 1.

B. Employment

The employment pattern in the Edmonton region has changed over the last decade. While the central area is actively being redeveloped and remains the focus of employment within the City, the suburban industrial areas have been attracting an increasing number of office and retail functions. These trends are expected to continue over the next ten years, with one-third of new jobs in Edmonton created within the downtown core and immediate fringe. The northwest and south/southeast industrial areas are anticipated to capture close to half of all new employment opportunities in Edmonton. Other new jobs are distributed among suburban areas, and subcenters in the developed area of the City. As with population growth, the allocation of employment in the City was developed in consultation with the Planning Department.

The allocation of employment between the City of Edmonton and surrounding region assumed that existing proportions would remain into the future, based on the availability of developable land within the City of Edmonton, following the annexation decision. In the future, 15% to 20% of employment increases have been established outside the City of Edmonton, consistent with regional planning.

Figure 5 and Table 3 illustrate the distribution of employment growth. A breakdown of employment increases, by area, is included in Appendix 1.

TABLE 3

ESTIMATED EMPLOYMENT DISTRIBUTION

	EMPLOYMENT		
	1982	1988	1993 (High)
Northeast	21,500	23,600	27,400
Southeast	52,500	66,500	84,800
South	47,500	54,500	58,700
Southwest	44,300	55,600	64,700
Northwest	31,600	34,100	45,100
Central	92,900	109,100	128,100
St. Albert - M.D. Sturgeon	8,600	11,300	13,300
Strathcona	19,300	26,800	29,500
Leduc	10,700	15,600	20,600
Parkland	6,200	10,900	15,500
TOTAL CITY	290,300 (86%)	343,400 (84%)	408,800 (84%)
SURROUNDING AREAS	44,800 (14%)	64,600 (16%)	78,900 (16%)
TOTAL	335,100	408,000	487,700

IV TRANSPORTATION DEMAND

The distribution of trips on the roadway and transit networks is a function of both the distribution of development activity within the City and the characteristics of the total urban transportation system. Figure 6 shows the growth in person trip generation in each sector of the City between 1982 and 1993.

This increase in trips generated, results in volume increases on all links in the transportation network. Figures 7 and 8 illustrate the anticipated increases in a.m. peak traffic flows across major boundaries in the transportation system, including the external/R.D.A. and Central Business District cordon, as well as three screenlines; the North Saskatchewan River, CNR north of Yellowhead Trail, and CPR east of Calgary Trail. The most dramatic increases in traffic volumes are anticipated southbound across the CNR north screenline (75% increase) and both directions crossing the external/R.D.A. cordon (75% increase). In the case of the CNR north screenline, this increase occurs because no major employment opportunities exist north of the CNR, to serve the large residential in population. In the case of the R.D.A. cordon, volume increases are due to population growth in the region, and between the R.D.A., and the City of Edmonton boundaries, as well as the development of major employment centers adjacent to Highway 2 south and Highway 16 west, both within and outside the City of Edmonton boundaries.

Within the next 10 year period, major increases in transit trips are also forecast to occur. Figure 9 illustrates the increases in a.m. peak hour transit trips crossing major screenlines and cordon lines in Edmonton. As the majority of transit routes will continue to focus on the Central Business District, a 70% increase in Central Business District cordon crossings is expected to occur. The other major increase in transit trips is expected on the North Saskatchewan River screenline, where a.m. peak hour river crossing trips are expected to increase by 75%.

As illustrated in Figures 6 to 9 the major transportation demand increases are concentrated in areas with the most growth in employment and population. This results in a need for new facilities to provide access to these areas.

To ensure the provision of an adequate roadway and transit infrastructure to serve these areas, it is necessary to outline the design criteria that are used in the facility planning process.

In urban arterial roadway operation, it is possible to relate delay at intersections to the volume/capacity ratio that exists on a particular approach to the intersection. In Edmonton, field measurements have confirmed that a relationship such as that depicted in Figure 10 exists between delays and the volume/capacity ratio. The design criteria utilized for facility planning is to ensure that the volume/capacity ratio does not exceed 0.9 on any roadway link. This may be interpreted as corresponding to a Level of Service 'E' design, as outlined in "Transportation Plan Part 1*.

While this is the basic requirement of the system, a number of other design requirements were utilized in the determination of facility requirements:

- provide basic two lane paved arterial roadways to allow vehicular and transit access to new subdivisions,

- provide for specific transit priority measures on corridors where bus volumes exceed 40 per hour, and where expected roadway congestion would result in transit schedule distruption,

- provide for balanced transportation capacity throughout the network,

- provide improvements that recognize the limited capacity of the downtown transportation network to absorb additional trips, both vehicular and transit,

The following sections outline the detailed assessment of existing and future operational problems, and outline a facility plan required to serve projected demands.

*The City of Edmonton Transportation Plan - Part 1, The City of Edmonton, July 1974

V EXISTING AND FUTURE NETWORK CAPACITY PROBLEMS

A. Existing (1982) Road Network Traffic Flows

Figure 11 depicts existing a.m. peak hour capacity problems.

These capacity problems are generally confined to local intersections, with the exception of the following corridors:

- Belgravia Road/114 Street corridor (Fox Drive - University Avenue)
- 75 Street corridor (101 Avenue - Argyll Road),
- 104 Avenue/Stony Plain Road corridor (97 Street - 156 Street),
- south Central Business District approaches (Dawson Bridge to - Groat Bridge),
- 23 Avenue (66 Street - 111 Street),
- 170 Street (79 Avenue - 107 Avenue),

B. Existing Transit Network

In terms of passenger capacity and level of service the majority of the developed City has access to service within a 400m distance and features a 45 minute maximum travel time to the CBD in the peak hour. Some new residential areas where populations are not sufficient to justify full service in all time periods are deficient in service levels especially mid-day and in the evenings and Sundays. Frequencies provided generally ensure that volume/capacity ratios do not exceed .9 for all hours of service. Certain routes do experience "over load" conditions in peak hours especially for travel to downtown and the University. These are a result of changing population patterns and are continually assessed to redistribute resources. Corridors with the highest average loadings and volumes include Southwest (Southgate) and Millwoods to Downtown. All downtown

and University routes exhibit average high loads while industrial and new residential feeders are typical of the least utilized routes. Figure 12 depicts existing (1982) transit flows on major corridors approaching the Central Business District.

Some service problems resulting from traffic congestion currently exist. These locations cause problems of schedule adherance and vehicle resource requirements. Jasper Avenue and 97 Street bus lanes have aided in relieving such problems.

In general, the congested routes serve the primary transit destinations to the downtown and university, and include:

- 101 Street from North
- Belgravia Road/114 Street
- 104 Avenue/Stony Plain Road
- south central business district approaches (Dawson Bridge, McDougall Hill, Bellamy Hill, 97 Avenue),

C. Assignment of Future Traffic Flows to 1983 Approved Road Network

An assignment of future traffic demands to the existing road network, including the 1983 construction program, was undertaken to assess the impact of a 'do nothing' option on network operation. Table 4 compares network operating characteristics in the Edmonton subregion road system over time.

TABLE 4

NETWORK OPERATING CHARACTERISTICS

YEAR	TOTAL (AUTO DR.) TRIPS	AVERAGE SPEED
1983	108,000	40 kmh
1988	120,000	36 kmh
1993 (high)	147,000	20 kmh

Figures 13 and 14 depict capacity problems in the 1983 network with an assignment of 1988 and 1993 traffic demands. A deterioration, over time occurs throughout the network, with the following areas experiencing the most severe congestion:

- radial routes accessing the Central Business District, and University area from all sectors,

- access to new residential areas; particularly Millwoods and the Meadows,

- access to major employment areas in the northwest and southeast,

D. Assignment of Future Transit Flows to 1983 Transit Routes

Figures 15 and 16 depict 1988 and 1993 a.m. peak hour transit flows on radial routes approaching the Central Business District. 1983 route capacity is also indicated, to identify those areas where growth in transit trips is anticipated to overload the current transit service. Growth in demand, approaching the Central Business District will require an overall increase in bus service, particularly in the 1989 - 1993 time period. The largest increase in transit trips to the Central Business District exists from the north - central, southwest and southeast. In the northeast, anticipated growth to 1993 can be accommodated by expanding to four car LRT trains.

In addition to the need for an increase in bus service to the downtown, the expected increase in road congestion will result in serious operating impacts on the transit system.

VI ANALYSIS OF FUTURE TRANSPORTATION SYSTEM REQUIREMENTS

A. Downtown Access

Edmonton's Central Business District is bounded by the CNR on the north, the North Saskatchewan River to the south, 97 Street to the east and the CPR to the west. In order to maintain the Central Business District as a viable commercial center for the City of Edmonton and region, it will be necessary to provide transportation capacity into this area to support planned development. There are a number of options to provide increased Central Business District access, utilizing both the roadway and transit networks.

Option 1 - expand vehicular access capacity and expand surface bus operation without special transit priority measures,

Option 2 - expand access capacity for surface buses, and provide whatever transit priority measures are possible both within and approaching the Central Business District to maintain effective operation of the transit fleet,

Option 3 - provide an expanded LRT system, in combination with some transit priority measures and specific roadway improvements which are targeted to improve the capacity and operation of the transit system,

The attainable person capacity into the Central Business District with these options is indicated in Figure 17. This capacity will directly impact upon the level of downtown employment that can be supported. Figure 18 relates attainable downtown employment and transit mode split.

To support the expected increase in Central Business District employment from 60,000 to 90,000 jobs by 1993, it will be necessary to increase the transit share of downtown destined trips from the current 45% level to 55%. This results in a much greater incremental increase in transit trips than auto trips, crossing the Central Business District cordon.

The expected growth in person trips to the Central Business District by sector is depicted in Figure 19. As this figure illustrates, existing volume/capacity ratios are highest in the west and south sectors. The major residential growth expected in the 1983-1993 time period will occur south of the North Saskatchewan River resulting in a need for the following major downtown access enhancements within the 10 year period.

- provision of Stages 1 and 2 of South LRT (downtown to University Farm) to serve the southwest and south central growth areas,

- provision of Dawson Corridor upgrading to provide both vehicular and surface transit access from the southeast Millwoods and the Meadows,

Given that the downtown street system can only absorb about 15% more vehicular traffic during peak periods, additional roadway system improvements will concentrate upon low cost facility enhancements which will benefit the movement of the transit system. The proposed Central Business District access measures are depicted in Figure 20, by time period, and include the following new facilities and facility enhancements:

South

- South LRT (Downtown to University Farm)
- Dawson Corridor (97 Street to 79 Street), including bus lane connections
- Connors Road Busway (82 Avenue to Low Level Bridge)

West

- Stony Plain Road tidal flow system/busway (149 Street to 105 Street)
- 100 Avenue/Victoria Park Road tidal flow system (Groat Road to 109 Street) and Groat Bridge widening

North, Northeast

- Kingsway transit corridor (127 Street to 101 Street)
- expansion of Northeast LRT to three car train operation,
- 106/107 Avenue one-way couplet (117 Street to 95 Street)
- 119 Street penetrator (Yellowhead Trail - 106 Avenue)

By restricting capacity improvements to existing arterial roadways, the community impacts of major new transportation facilities will be minimized. This result is a direct benefit of an increased emphasis on transit as the major mode of downtown access.

B. Access to Developing Residential Areas

In order to support anticipated growth in outlying residential areas, it will be necessary to continue to expend a major portion of roadway construction funds on provision of basic access. The situation is expected to be most serious in southeast Edmonton as the Millwoods/Meadows area will continue to be the focus of major residential growth and over the next 10 year period. Conversely, in the northeast area, only minimal facility enhancements will be required, after the completion of the 1983 construction program.

Examples of roadway enhancements required to provide access to new residential areas include:

- upgrading of 23 Avenue (17 Street - Terwillegar Drive)
- 34 Street (Whitemud Drive - 23 Avenue)
- 127 Street (137 Avenue - 167 Avenue)

C. Access to Northwest and South/Southwest Industrial Areas

Within the last ten years, the character of the outlying industrial areas has experienced a marked change. These areas were primarily intended to be light industrial and warehouse districts, but are now developing a large commercial and office component. In particular, the areas adjacent

to Highway 2 south, and Highway 16 west are expected to continue to develop as major office and commercial areas. Based on an extension of current trends, the northwest and south/southeast areas are expected to contain up to 50% of all new jobs created in the City of Edmonton over the next 10 year period.

Currently, only a very small component of trips to these areas is accommodated by transit. This is expected to continue for the forseeable future, as the low density development found in these areas is not conducive to transit service. As well, the availability of employee parking means that there is little incentive to utilize public transportation services.

The concentration of residential growth in the south and north central areas results in a major increase in trips between these areas and the outlying industrial areas. As a result, major volume increases are expected on connecting roadways such as Yellowhead Trail and Whitemud Drive. Traffic flows between the southeast and northwest are expected to increase beyond the capacity of the Quesnel Bridge and its approaches. To accommodate the increase in traffic in this area, it will be necessary to provide the southwest quadrant of the Outer Ring Road, (50 Street to Yellowhead Trail) by 1993, including a new river crossing.

D. Public Transportation Needs

The growth in transit demand outlined in Figures 15 and 16 indicates that by 1993, deficiencies in transit service will exist in all corridors approaching the Central Business District cordon. At the same time, however, these flows are being compared to the transit service provided following the February, 1983 reductions in service. The determination of future transit fleet requirements has been based on maintaining the current service levels (i.e., after the February, 1983 cutbacks). Total transit demand crossing the Central Business District cordon is forecast to increase by 16% between 1982 and 1988, resulting in the overloading of certain surface transit corridors. In the second 5 year period, however, growth in transit ridership will exceed the capacity of all corridors.

From the analysis of growth in demand and capacity deficiencies approaching the Central Business District, it was clear that a justification exists for the south LRT line, extending from Corona Station to the University Farm. Construction of this stage of LRT, in combination with bus lanes on Connors Road, and Dawson Corridor, will alleviate the severe shortfall in person capacity on the south approaches to downtown.

In addition to requirements directly related to fleet expansion other transit capital projects identified for the 1984 - 1993 period include: (details in Appendix 3).

- development of transit centers in new residential areas, and upgrading of existing transit centers,
- conversion of mainline transit routes to trolley operation,
- ongoing maintenance of trolley lines, bus shelters and garages,

E. Bikeway Requirements

No major expansion of the City's bikeway system is planned within the next 10 year period. New bikeways will be considered for inclusion in specific projects, when appropriate, to complement the city wide bikeway system.

VII RECOMMENDED 5 AND 10 YEAR PLAN (BASED ON DEMAND ASSESSMENT)

In order to accommodate increased transportation demands, and maintain the transportation network at a volume/capacity level not exceeding 0.9, it will be necessary to provide new facility enhancements.

A. Recommended 5 Year Roadway Plan (1984 - 1988)

Based on the roadway capacity deficiencies that have been identified, a roadway program has been developed to maintain current operating levels on the roadway system. The recommended program outlined in Figure 21, generally consists of the following improvements:

- extension of arterial roadways into new residential and industrial areas,

- completion of existing arterial roadways in outlying areas, as subdivision infilling occurs,

- upgrading of the truck route loop (Yellowhead Trail, Whitemud Drive, 170 Street) to maintain reasonable access between major highways and industrial areas, as well as providing capacity for increased flows between residential areas and these industrial areas,

- provision of transportation systems management improvements in the Inner City, to benefit transit access to the Central Business District, and, to a lesser extent, assist the distribution of automobile trips into the downtown area,

To provide for the long term distribution of regional traffic, and provide improved highway connections, a start of the Outer Ring Road is recommended, with the 79 Avenue to Yellowhead Trail section identified as most important.

B. Recommended 5 - 10 Year Roadway Plan (1989 - 1993)

The recommended program for the second half of the 10 year time frame (1989 - 1993) based on a high population growth rate, is illustrated in Figure 22. The proposals included for this time period reinforce the improvements outlined in the initial 5 year period.

The development of employment and residential areas in Edmonton beyond the RDA, in both the west (Lewis Farms, Winterburn Industrial) and south (Daon 80) lead to a requirement for the Outer Ring Road to be completed from Yellowhead Trail to 50 Street as a two lane roadway, with some sections upgraded to four lane operation. Due to regional traffic increases, a need also exists to upgrade Highway 2 South and Yellowhead Trail West to freeway operation between the City limit and the Outer Ring Road.

C. Recommended 5 Year Transit Capital Program (1984 - 1988)

The recommended transit capital program to accommodate expected demand increases from 1983 - 1988 is shown in Figure 23. The major capital investment within this time period is the construction of the first phase of south LRT, from Corona Station to the University as a double track line. Construction beyond the University, though desirable, is not feasible within the 5 year period, given the magnitude of construction.

As the existing fleet will accommodate growth in demand to 1988, no need exists for an additional garage.

To enhance transit service to the downtown and other major destinations, the capital program includes upgrading of existing transit centres in new residential areas. Although funded in the roadway program, bus lane extensions are shown on the capital program to indicate locations where increased transit flows are being accommodated through transit priority measures.

D. Recommended 5 - 10 Year Transit Capital Program (1989 - 1993)

In the second 5 year period, the major transit capital investment will continue to be the south LRT extension, from the University to the University Farm as a double track line. In conjunction with this extension, a major terminals will be required at the University Farm. This will be a major transfer point for Jasper Place and South Edmonton passengers destined to the University. In addition most transit routes from southwest Edmonton to downtown will feed into the University Farm terminal (Figure 24).

Within the first 5 years, the spare capacity in the existing transit fleet will have been absorbed. To accommodate expected growth in the 1989 - 1993 period will require the provision of new buses, and an additional garage, located in the northeast. The expansion of the LRT system to four car trains will require the provision of new equipment, and expanded garage facilities. To maximize the productivity of individual routes, it is recommended that new trolley and dual buses should be articulated.

As with the initial 5 year period, the addition of new transit centers will be required in the 1989 - 1993 period to enhance transit service from new areas. Additional bus lanes are also planned in this time period, to improve downtown accessibility.

The extension of LRT beyond the University Farm is not planned until a review of city wide LRT priorities has been completed.

VIII FINANCIAL CONSTRAINTS

The roadway and transit improvement programs identified in the previous chapter reflect the investments that must be made to maintain acceptable operation in the transportation system over a 10 year period.

In addition to satisfying the travel demand, however, it is also essential that the proposed program be financially feasible.

A number of financial constraints have been identified that affect the amount of construction work that can be undertaken over the 10 year program. These include:

A. Limits on City Debenture

City Council has outlined guidelines that restrict the City share of funding available for capital projects. These limits are outlined in Table 5, and have the effect of decreasing funds available for transportation construction when compared to 1983 levels. It is assumed that the transit capital program is funded entirely by the provincial government transit capital grant. This is necessary as the City cannot absorb any debenture beyond that created by the roadway program.

TABLE 5

CITY DEBENTURE GUIDELINES

YEAR	DEBENTURE LIMIT ($ MILLION)
1984	19.0
1985	18.0
1986	19.0
1987	20.0
1988	21.0
1989 - 1993	increase at 5% per year

B. Provincial Government Funding (Roadways)

Over the past 5 year period, the Province has provided roadway funding to the City of Edmonton under four major programs; Arterial Roadway, Railway/Highway Grade Separation, Transportation Systems Management, and Continuous Corridor. All programs were cost shared two-thirds by the Province, with the exception of the continuous corridor, where 90% of costs have been paid by the Province. It has been assumed that Provincial funding will continue on the same cost shareability formula, at increases of 8% per year from the 1983 base level. Table 6 summarizes assumed funding that will be available from the Province. In the 1986 - 1993 period, it is assumed that continuous corridor funding will be divided evenly between Yellowhead Trail and the Outer Ring Road.

TABLE 6

ASSUMED PROVINCIAL FUNDING (ROADWAYS)

YEAR	1984	1985	1986	1987	1988	1989 - 1993
Arterial Roadway	15.6	16.9	18.2	19.7	21.3	+8% per yr.
Railway/Highway Grade Separation	3.2	3.5	3.8	4.1	4.4	+8% per yr.
Transportation System Management	1.5	1.6	1.7	1.9	2.1	+8% per yr.
Continuous Corridor						
a) Yellowhead Trail	16.3	17.6	9.5	10.3	11.1	+8% per yr.
b) Outer Ring Road			9.5	10.3	11.1	+8% per yr.

C. Provincial Government Funding (Transit)

Currently, the Province funds the full cost of transit capital construction to an annual limit. It has been assumed that this practise will continue in future, with an annual increase of 8% per year from 1984 levels, as shown in Table 7. As has been indicated, the provincial government capital grant is assumed to be the only source of funding for the transit capital program.

TABLE 7

ASSUMED PROVINCIAL FUNDING (PUBLIC TRANSIT)

YEAR	TRANSIT CAPITAL GRANT
1984	25.0
1985	27.0
1986	29.2
1987	31.5
1988	34.0
1989 - 1993	increase at 8% per year

D. Non-Provincial Cost Shareable Roadway Programs

In addition to the programs outlined here, the Engineering Department has a number of other programs that commit a large portion of the City debenture that are not cost shareable. These programs include the following:

- local improvement
- design and preliminary survey
- bridge structures
- operating yards and plants
- snow disposal sites
- signalized traffic control
- computerized base mapping system
- land slide repairs

The value City debenture required for each of these programs, over time, are shown in Table 8. These projects represent programs that are considered essential.

TABLE 8

CITY DEBENTURE REQUIRED FOR NON-ROADWAY PROGRAMS

YEAR	ANNUAL CITY DEBENTURE FOR NON-SHAREABLE PROGRAMS ($MILLION)
1984	5.8
1985	5.5
1986	5.6
1987	6.6
1988	7.7
1989	7.1
1990 - 1993	increase at 5% per year

IX THE FINANCIALLY CONSTRAINED PROGRAM

With application of the financial constraints to the demand based transportation plan, it became apparent that certain components of both the roadway and public transportation sectors would have to be modified. The following sections outline the projected annual capital requirements as well as the elements of the demand based plans that have been deleted.

A. Recommended 5 Year Roadway Program (1984-1988)

The imposition of financial guidelines on the recommended 5 year plan (1984-1988) results in the annual Engineering Department capital program as shown in Table 9.

TABLE 9

ANNUAL ENGINEERING DEPARTMENT CAPITAL PROGRAM (1984-1988)

(COST IN $ MILLION CURRENT DOLLARS)

	1984	1985	1986	1987	1988
PROGRAMS					
Continuous Corridor					
- Yellowhead Trail	12.0	18.0	11.6	11.9	12.9
- Outer Ring Road	-	-	10.1	11.9	12.9
Transportation System Management	2.4	2.5	2.7	3.0	3.3
Arterial Roads, Truck Route Loop	27.0	28.7	26.5	27.1	24.1
Rail/Highway Grade Separation	0	0	0	0	0
Other Programs	18.8	18.0	19.6	21.0	22.6
TOTAL	60.2	67.2	70.5	74.9	75.7
SOURCES OF FUNDING					
City Debenture	19.0	19.5	20.6	20.9	21.6
(Debenture Guideline)	(19.0)	(18.0)	(19.0)	(20.0)	(21.0)

TABLE 9 (Cont'd)

ANNUAL ENGINEERING DEPARTMENT CAPITAL PROGRAM (1984-1988)

(COST IN $ MILLION CURRENT DOLLARS)

	1984	1985	1986	1987	1988
(Provincial Cost Sharing Available)	(36.0)	(39.6)	(42.7)	(46.3)	(50.0)
Provincial Cost Sharing Used	26.9	32.1	37.5	41.2	39.2
Other Local Improvement, Developer	14.3	15.6	12.4	12.8	14.9
TOTAL	60.2	67.2	70.5	74.9	75.7

NOTE: Construction costs increase at 5% per year between 1984 and 1988. Provincial funding is assumed to increase at 8% per year.

The resulting financially constrained roadway program is depicted in Figure 25. Appendix 2 details the construction work that can be undertaken within the initial 5 year period. An examination of Table 8 reveals that by remaining within the City debenture guidelines for the 1984-1988 time period, no funds are available to construct rail/highway grade separations and some arterial roadway improvements. This means that although funding growth are available, the City cannot allocate the necessary financial resources to match grants. In particular, the following rail/highway grade separations cannot be built:

- 100 Avenue at CPR west of 109 Street (required for maintenance),
- 99 Avenue at CPR west of 109 Street (required for maintenance),
- 82 Street at CNR north of Yellowhead Trail (widen to six lanes),
- Fort Road at CNR north of Yellowhead Trail (replace with a four lane underpass),
- 50 Street at CNR north of Yellowhead Trail (construct a six lane underpass),

By relaxing the City debenture guidelines to enable available Provincial rail/highway grants to be utilized would result in the addition of between 1.5 and 2.0 million per year to the City debentures.

B. Recommended 5 - 10 Year Roadway Plan (1989-1993)

Table 10 outlines the Engineering Department capital program, by year for the 1989-1993 time period, by applying the financial guidelines that have been outlined. A detailed breakdown of construction projects is outlined in Appendix 2.

TABLE 10

ANNUAL ENGINEERING DEPARTMENT CAPITAL PROGRAM (1989-1993)

(COST IN $ MILLION CURRENT DOLLARS)

	1989	1990	1991	1992	1993
PROGRAMS					
Continuous Corridor					
- Yellowhead Trail	13.9	11.3	10.7	11.1	3.2
- Outer Ring Road	13.9	15.1	16.3	17.6	19.0
Transportation System Management	3.5	3.6	3.8	4.0	4.2
Arterial Roads	26.4	26.9	27.0	28.6	33.8
Rail/Highway Grade Separation	0	0	0	0	0
Other Programs	22.6	23.8	25.6	26.6	27.8
TOTAL	80.3	80.7	83.4	87.9	88.0
SOURCES OF FUNDING					
City Debenture	23.3	23.3	24.2	25.5	26.9
(Debenture Guideline)	(22.0)	(23.2)	(24.2)	(25.5)	(26.8)
(Provincial Cost Sharing Available)	(54.0)	(58.3)	(63.0)	(68.0)	(73.5)
Provincial Cost Sharing Used	43.6	42.7	43.8	46.4	44.3
Other Local Improvements, Developer, etc.	13.4	14.7	15.4	16.0	16.8
TOTAL	80.3	80.7	83.4	87.9	88.0

NOTE: Costs increase at 5% per year between 1989 and 1993. Provincial funding assumed to increase at 8% per year.

The financially constrained construction program (1989-1993) is depicted in Figure 26. As with the initial 5 year period, adhering to the City debenture guidelines will result in no City funding available for rail/highway grade separations and some arterial construction, although funding would be available. This leads to a deletion of a number of critical rail/highway grade separations from the construction program:

- 156 Street at CNR north of Yellowhead Trail (construct a four lane underpass),
- Whitemud Freeway at CPR west of 99 Street (construct a four lane underpass),
- Whitemud Freeway CPR east of 17 Street (construct a four lane underpass),
- 91 Street extension at CPR east of Calgary Trail (construct a four lane underpass),
- Capilano Freeway extension north of 120 Avenue (construct a four lane underpass),

C. Recommended Transit 5 Year Capital Program (1984-1988)

Figure 27 depicts the financially constrained transit capital program for 1984 - 1988, while Table 11 summarizes the financial requirements. Appendix 3 itemizes the elements of the transit program.

The major capital investment during this time period is South LRT. The demand based plan recommends a double track system all the way to the University Farm at a cost of $170 million in 1983 constant dollars. In conjunction with other capital requirements, this level of expenditure could not be supported. Therefore, it is recommended that a single track line only, be constructed at a cost of $120 million in 1983 constant dollars. In the five year period, 1984 - 1988, 83% of these funds will be expended. In current dollars this represents $117.9 million. By 1988 the single track line will be completed to the University of Alberta.

Capital requirements for the surface fleet operations will have to be strictly controlled during this time period because most of the available funding will be used to construct the LRT extension.

Improvements will be limited to critical trolley line extensions and terminal improvements. No additions to the bus fleet itself are contemplated.

TABLE 11

ANNUAL TRANSIT DEPARTMENT CAPITAL PROGRAM (1984 - 1988)

(COST IN $ MILLION CURRENT DOLLARS)

	1984	1985	1986	1987	1988
Light Rail Transit	10.5	22.0	23.1	30.4	31.9
Bus Transit	3.7	3.9	4.0	4.2	4.5
	14.2	25.9	27.1	34.6	36.4
SOURCE OF FUNDING					
Provincial Transit Grant	25.0	27.0	29.2	31.5	34.0
Transit Grant Available*	10.0 **	22.4	25.3	29.5	28.4
Transit Grant Advancement	4.2	3.5	1.8	5.1	8.0

* Represents the Annual Provincial Grant minus Grant Monies Advanced to a previous year and the interest associated with the advance (based upon 10%/annum).

** $15.0 million already advanced to 1983.

NOTE: Construction costs increase at 5% per year between 1984 and 1988. Provincial funding is assumed to increase at 8% per year.

D. Recommended 5 - 10 Year Transit Capital Program

Figure 28 illustrates the improvements proposed in the financially constrained transit capital program for 1989 - 1993. Table 12 outlines cash flow requirements for this same time period.

LRT expenditures will cover three areas; extension of a single track line from the University of Alberta to the University Farm; improvements to stations along the northeast line and acquisition of new vehicles and the construction of the necessary storage and maintenance facilities.

This is estimated to cost $73.9 million in current dollars. LRT program for this time period does not include funds to twin the track on south LRT, nor does it include funds for implementation of any other lines.

To respond to the growth in demands on the surface fleet a major investment in new transit equipment will be required. In addition a new garage in northeast Edmonton will be required, along with more improvements to the transit terminals and expansion of the trolley system. DATS equipment will also have to be replaced and expanded.

Appendix 3 summarizes the requirements of the transit system over this time period. It is presently estimated that all of the items identified for the bus transit operation cannot be provided without the provision of additional funds.

TABLE 12

ANNUAL TRANSIT DEPARTMENT CAPITAL PROGRAM (1989 - 1993)

(COST IN $ MILLION CURRENT DOLLARS)

	1984	1985	1986	1987	1988
Light Rail Transit	24.2	25.4	11.9	12.4	-
Bus Transit	4.8	13.2	30.9	33.9	50.0
	29.0	38.6	42.8	46.3	50.0
SOURCE OF FUNDING					
Provincial Transit Grant	36.7	39.7	42.8	46.3	50.0
Transit Grant Available	27.9	38.6	42.8	46.3	50.0
Transit Grant Advancement	1.1	0	0	0	0

NOTE: Costs increase at 5% per year between 1989 and 1993. Provincial funding assumed to increase at 8% per year.

X NETWORK OPERATION WITH THE FINANCIALLY CONSTRAINED PROGRAM

A. Analysis of Network Operation in 1988

Figure 29 outlines roadway improvements that are required to accommodate traffic demand by 1988 that have been deleted from the financially constrained 5 year plan.

To quantify the impact of the financially constrained roadway program on network operation, an assignment of 1988 demand to the 1988 financially constrained network was undertaken. Figure 30 depicts those roadway links where capacity problems are anticipated.

The problems depicted in this figure are:

- capacity deficiency crossing the CNR north screenline (Fort Road to 127 Street),
- capacity problems on south Central Business District approaches (Groat Road to 99 Street),
- University area access problems (Belgravia Road, 114 Street),
- access from Sherwood Park to Edmonton on the Sherwood Park Freeway,

The most severe network problem is along the CNR north screenline. The deletion of rail/highway grade separations from the financially constrained program results in severe overloading, not only of the locations directly affected (82 Street, Fort Road), but also of 97 Street and 127 Street, due to flow diversions. On the south Central Business District approaches, a capacity deficiency exists for access from the southwest to downtown. It is for this reason that south LRT must be constructed, as no potential exists for improving the 105 Street, Low Level, or James MacDonald Bridge accesses without overloading the downtown road network.

The capacity deficiencies on Belgravia Road and 114 Street represent a continuation of existing problems in this area. The proposed paving of Keillor Road and reconstruction of 114 Street to introduce a five lane tidal flow operation will not accommodate expected demand increases in the area, but should provide some relief from shortcutting traffic problems in Belgravia and McKennan. This upgrading of 114 Street will also allow temporary relief for bus operation on 114 Street, until LRT can be completed.

B. Analysis of Network Operation in 1993

Roadway improvements that could not be included in the 1989 to 1993 roadway program due to financial constraints are depicted in Figure 31. The impacts of these program deletions on network operation are shown in Figure 32, which represents a loading of 1993 traffic demands onto a network that includes all improvements outlined in the 1984-1993 financially constrained program.

The following major problem areas are evident from an analysis of the network:

- capacity deficiency crossing the CNR north screenline (50 Street to 156 Street),
- capacity problems accessing the Central Business District from the south, north and west,
- access deficiencies in Millwoods, Meadows, Daon 80, Terwillegar and Northwest Edmonton,
- access deficiency approaching the Northwest Industrial Area from St. Albert and Northwest Edmonton,
- University area access (Belgravia Road, 114 Street),

- Whitemud Freeway overloaded through the non-freeway sections (99 Street, Calgary Trail and 122 Street intersections),

- access to Capilano Freeway from Northeast Edmonton,

The capacity deficiency across the CNR north screenline is predominantly due to the removal of Railway grade separation improvements (50 Street, Fort Road, 82 Street, Capilano Freeway, 156 Street) from the roadway program due to lack of funding. At the same time, however, even if it were possible to construct these grade separations, a net capacity deficiency would exist across this screenline due to the growth in population north of the CNR.

The downtown vehicular access deficiency represents a continuation of present trends, and would result in severe transit impacts without the implementation of new transit corridors to provide access into the area; the Connors Road busway and Dawson Corridor from the southeast, 97 Street and Kingsway Avenue from the north, Stony Plain Road bus corridor from the west, and LRT from the northeast and southwest. The implementation of south LRT will also allow transit to bypass the continuing congestion on 114 Street and Belgravia Road.

Most of the remaining access deficiencies in outlying residential and industrial areas are a function of the population and employment growth assumptions that have been used. Should a lower growth rate prevail to 1993, the deficiencies outlined in areas such as Daon 80 and the Meadows may not exist, or be of a reduced scale.

C. Transit Network Operation in 1988 and 1993

The provision of south LRT (Corona to the University Farm), in combination with key transit priority corridors into the Central Business District will ensure that transit can serve its major destination points (Central Business District and University of Alberta) with minimal interference from any traffic congestion that may exist.

The financial constraints imposed upon the transit program will limit Edmonton Transit system's flexibility to respond to the estimated future demands. The lack of a double track system on South LRT will limit its capacity since it will only be possible to operate on 10 minute headways rather than 5 minute. Only part of this loss can be recovered by the operation of four car trains. The surface fleet operation should not be severely impacted by these constraints. However, the timing of the availability of the funds may result in temporary service shortfalls.

Five and Ten Year Transit and Roadway Facility Program

RECOMMENDATION: That the report on the Five and Ten Year Transit and Roadway Facility Program be received as information, to be used as the Transportation Strategic Planning submission and as a guideline for future transportation facility programming.

HISTORY

As part of the City of Edmonton corporate planning process an annual identification of future facilities is required. As well Alberta Transportation Urban Assistance Program guidelines require the availability of a 10 Year facility program. As part of the transportation planning process identified in TRANSPLAN the development of documentation for Civic and Provincial purposes was outlined.

DISCUSSION

In order to fulfill the corporate and Provincial requirements, a complete update of transportation facility requirements for a five and ten year period was carried out. This update incorporated the latest information on development trends, transportation demand and financial constraints.

ENCLOSURE

I Five and Ten Year Transit and Roadway Facility Program

Prepared by:
Transportation Management Department
April, 1983

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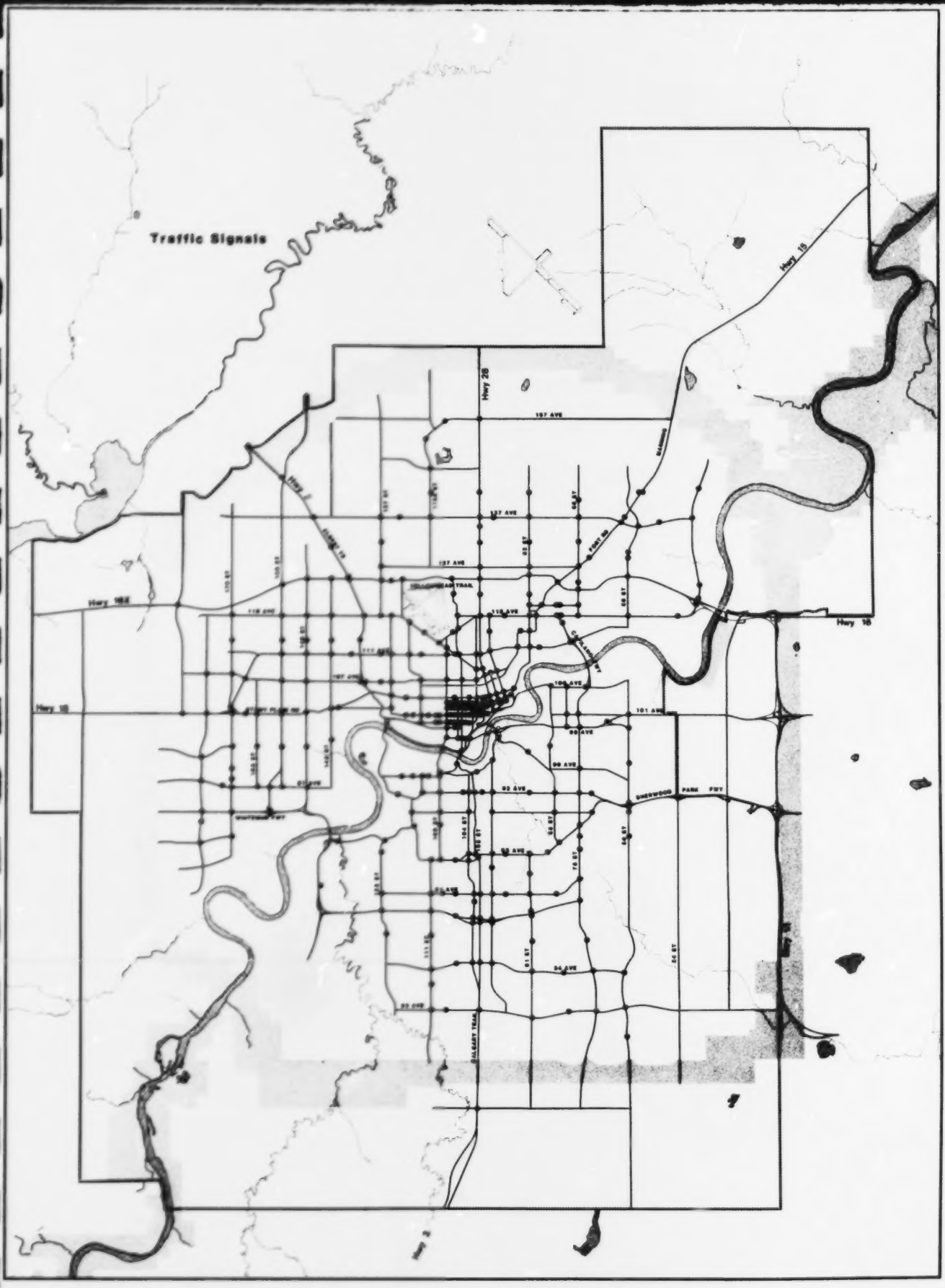
APPENDIX 1 - POPULATION & EMPLOYMENT DISTRIBUTION BY AREA

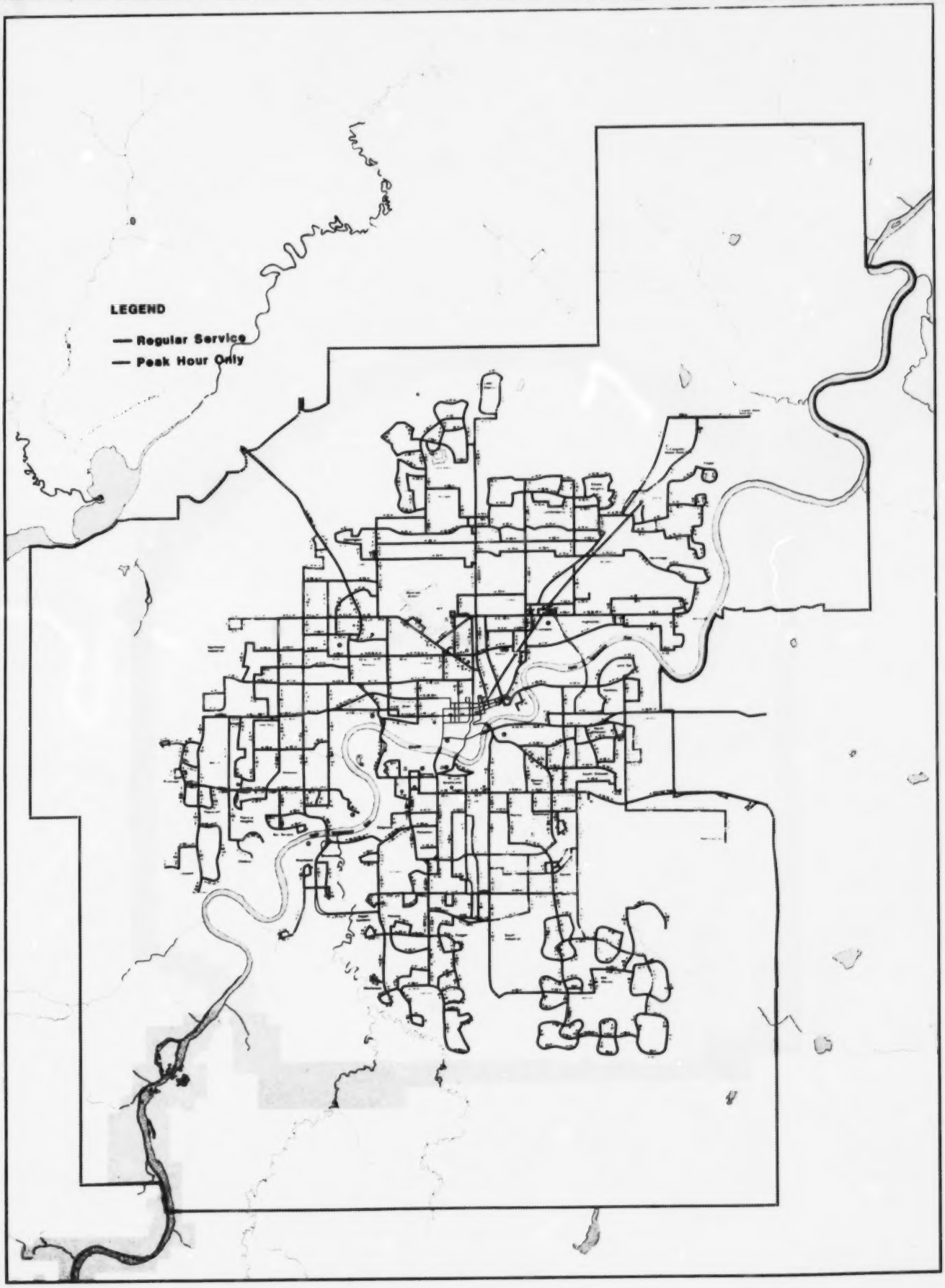
APPENDIX 2 - ROADWAY CAPITAL PROGRAM 1984-1993

APPENDIX 3 - TRANSIT CAPITAL PROGRAM 1984-1993



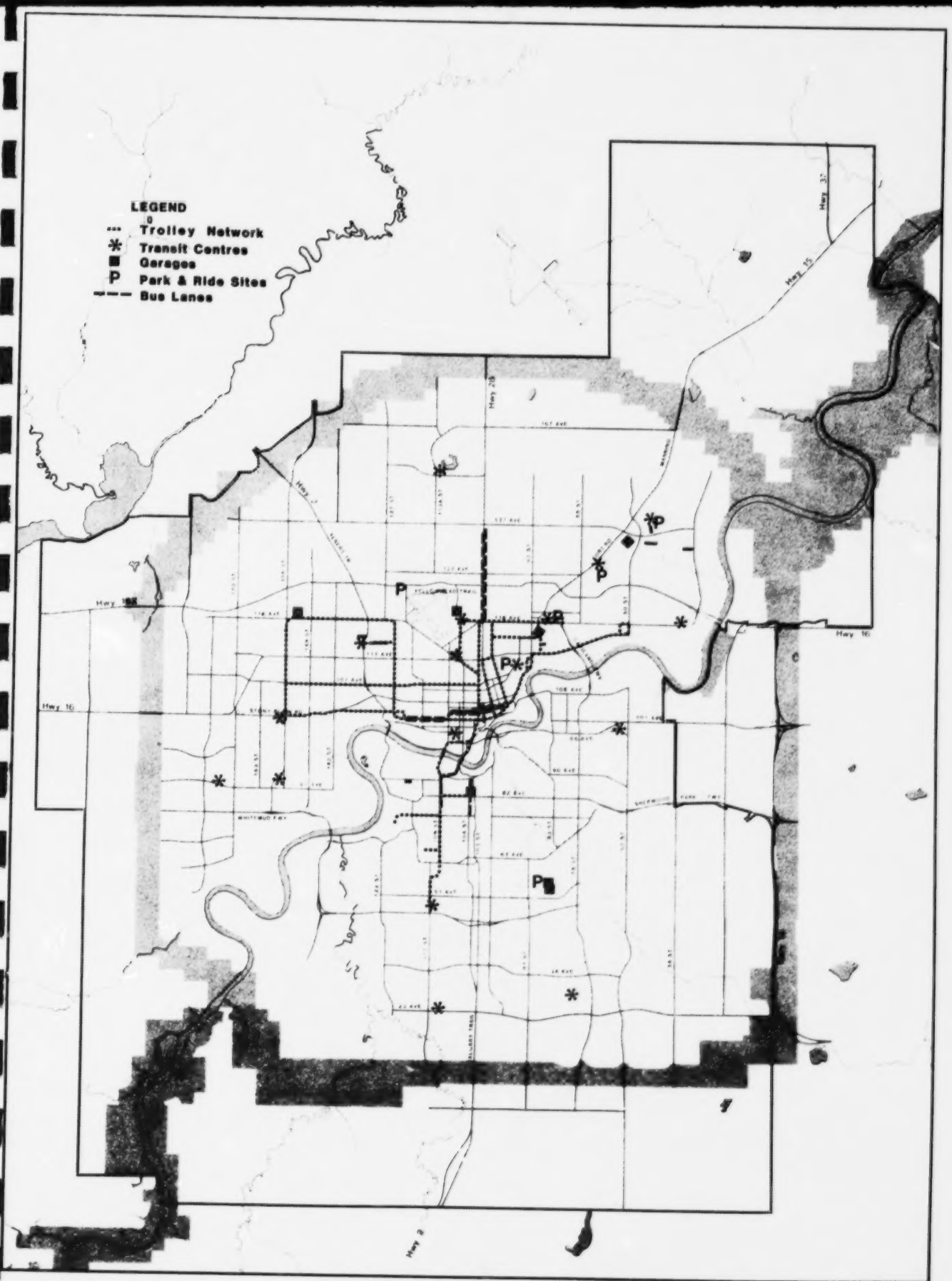
EXISTING ARTERIAL NETWORK

Figure 1

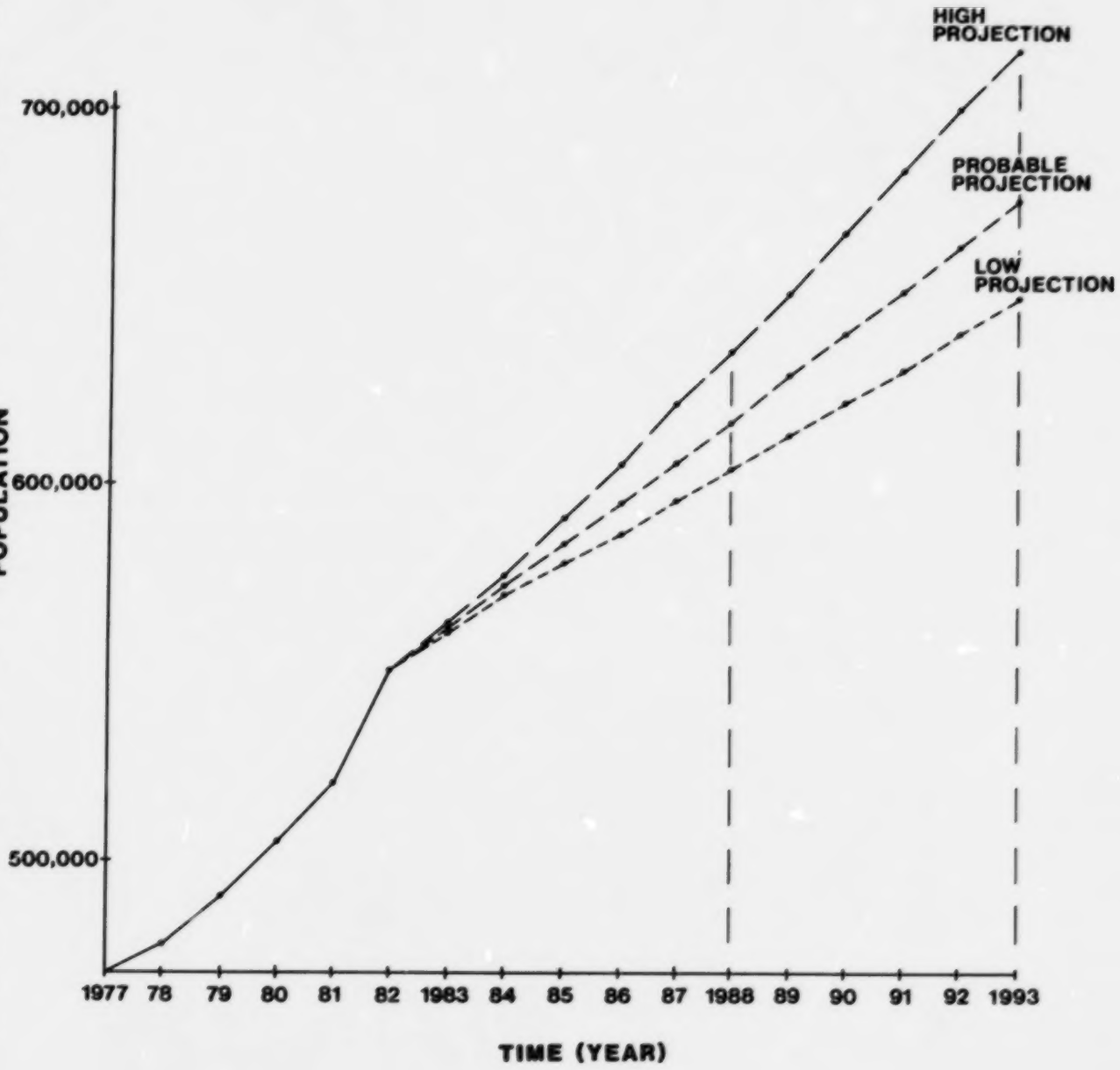


EXISTING TRANSIT NETWORK

Figure 2

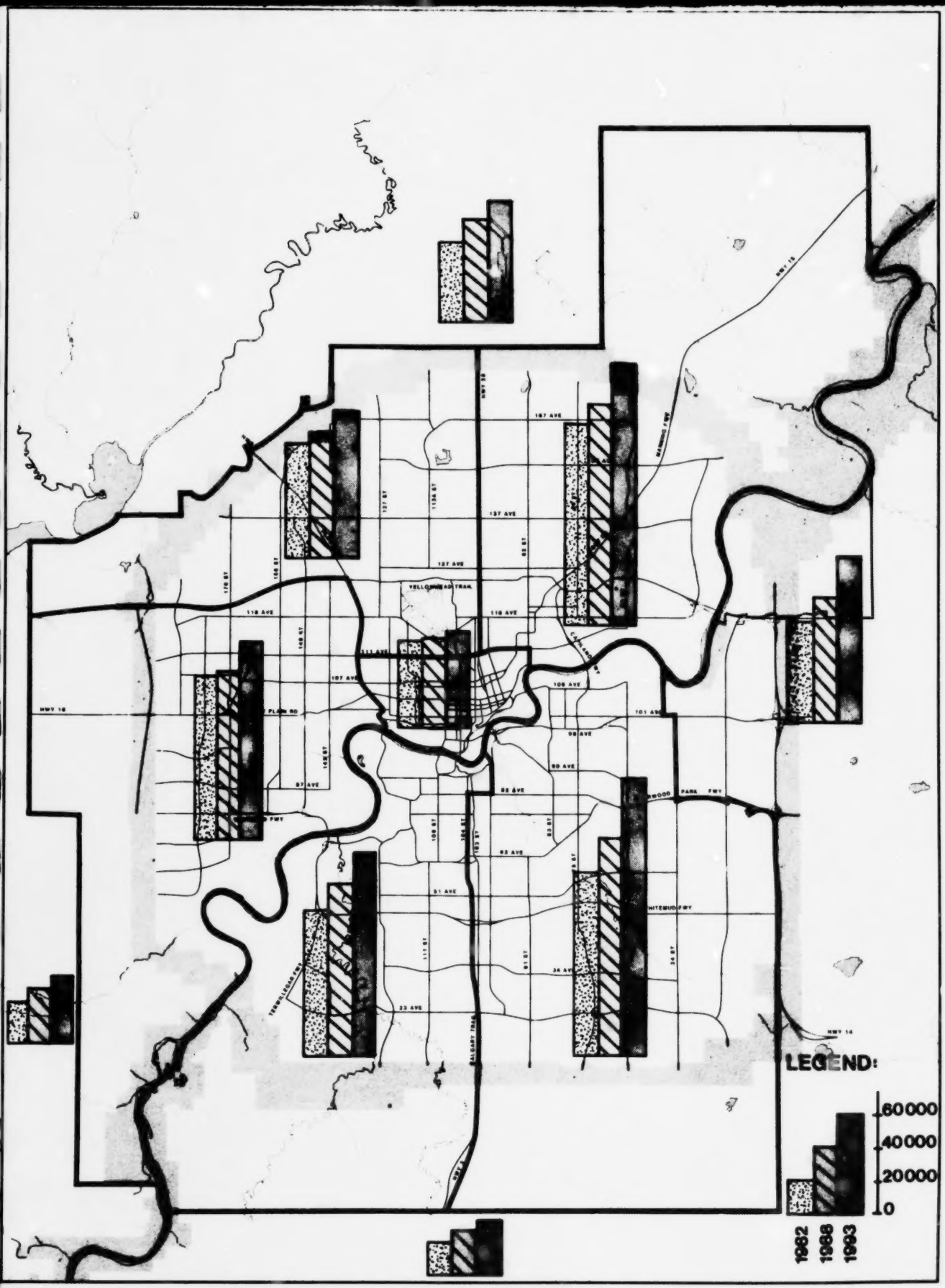


EXISTING TRANSIT FACILITIES **Figure 2A**



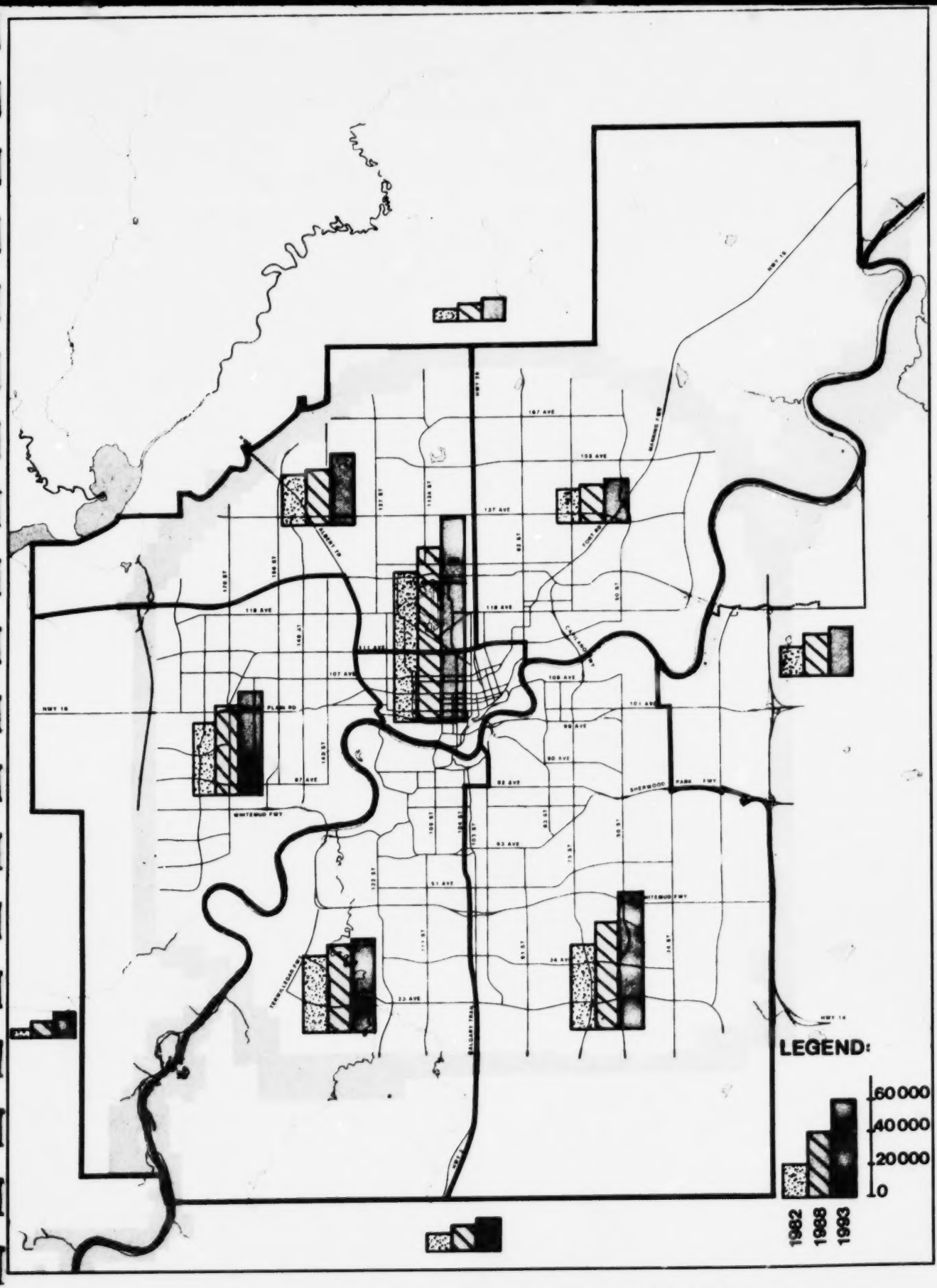
POPULATION GROWTH WITH IN CITY 1977-1993

Figure 3



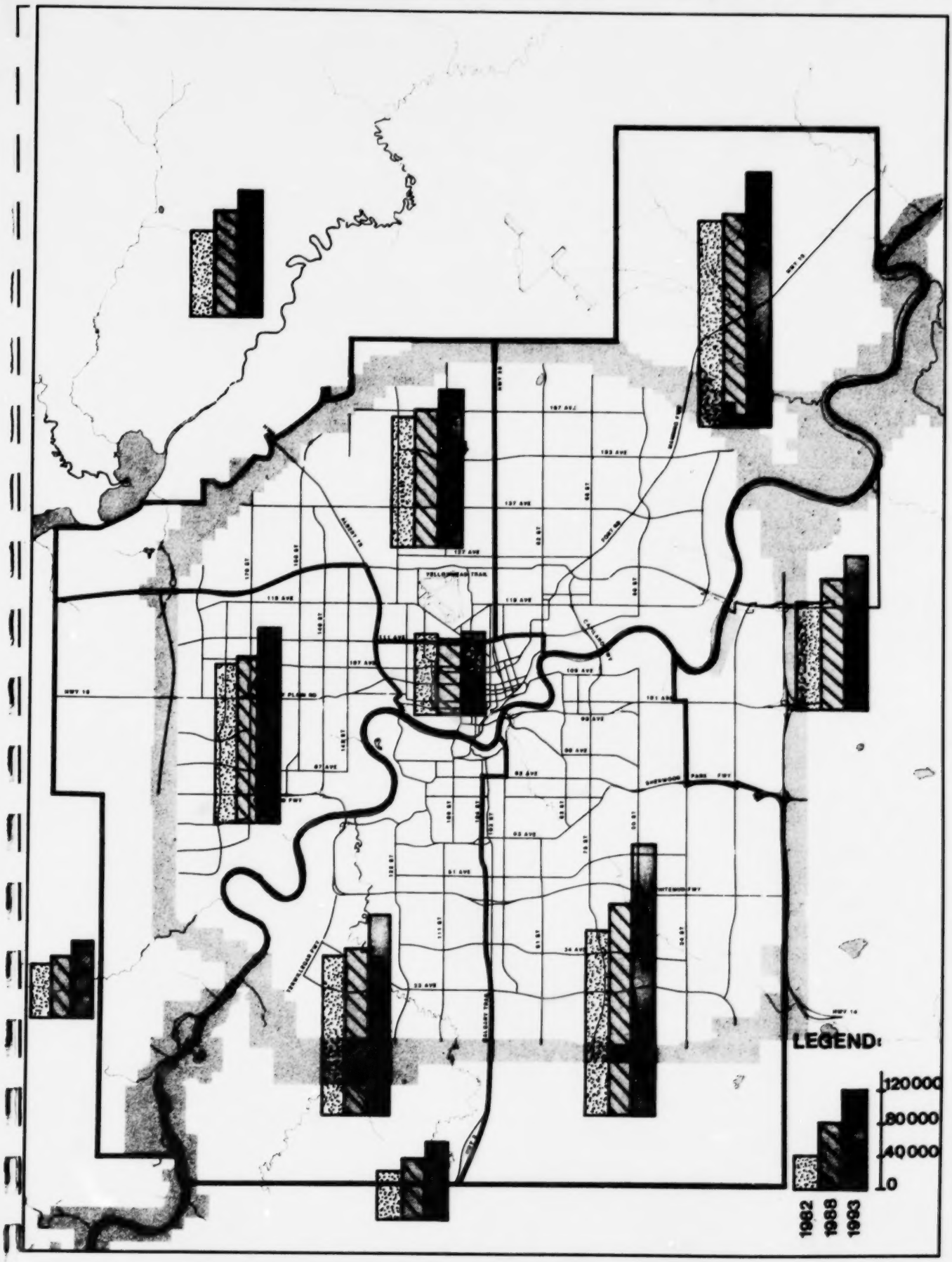
DISTRIBUTION OF POPULATION GROWTH BY SECTOR

Figure 4



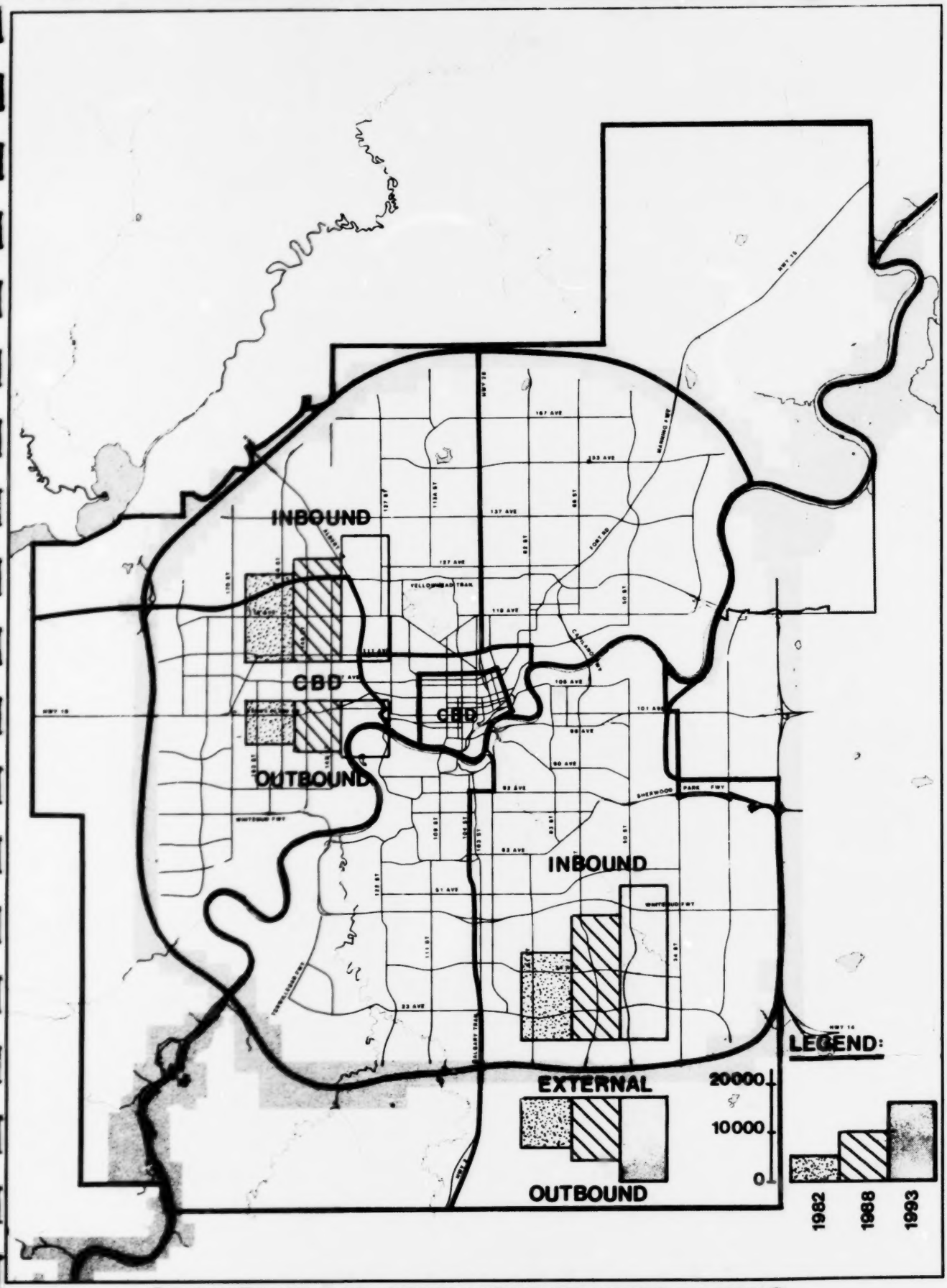
DISTRIBUTION OF EMPLOYMENT GROWTH BY SECTOR

Figure 5

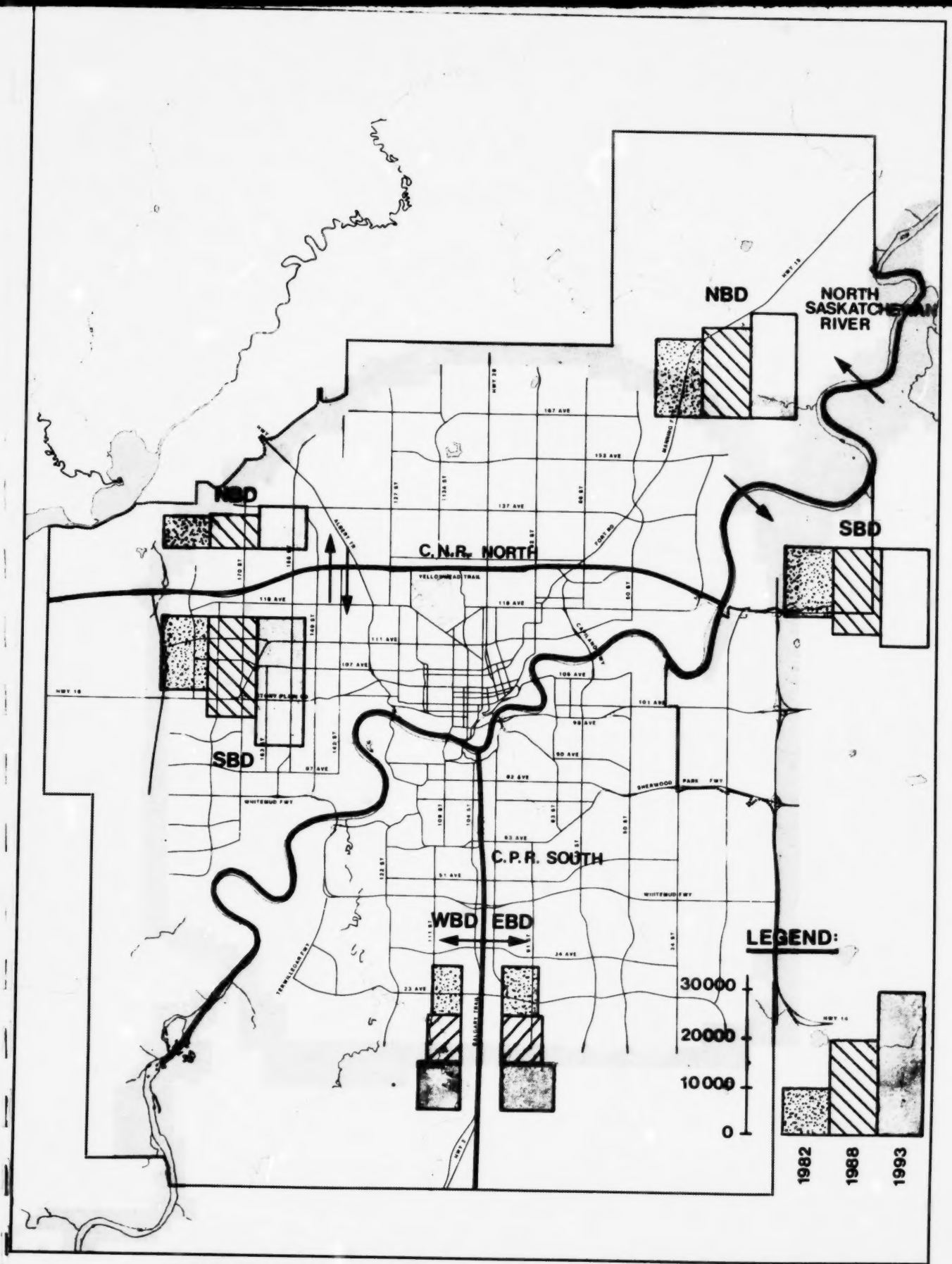


GROWTH IN TRANSPORTATION DEMAND 1981-1993
(Total A.M. Peak Person Trips)

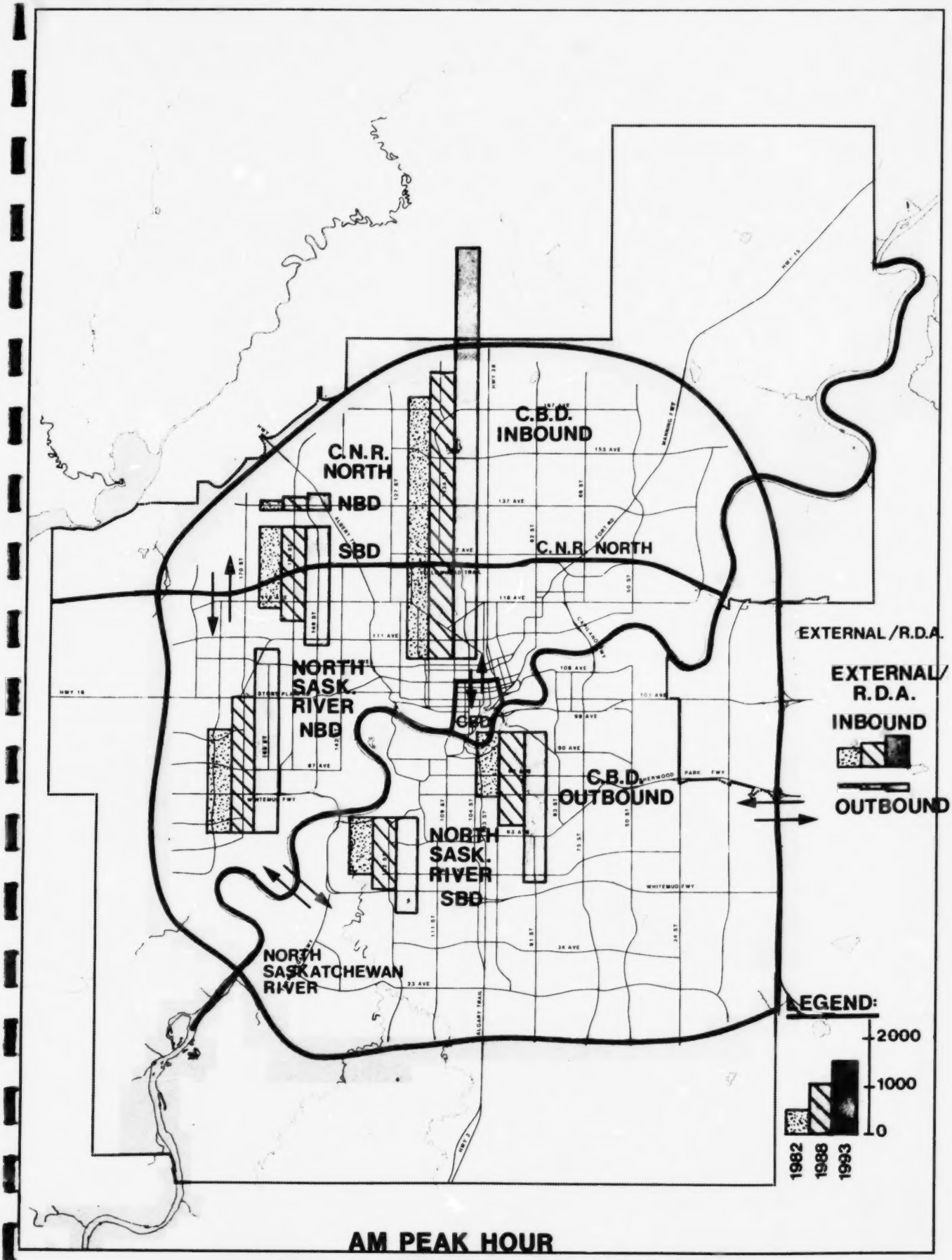
Figure 6



GROWTH IN A.M. PEAK HOUR TRAFFIC FLOWS ACROSS MAJOR CORDON LINES 1982-1993 **Figure 7**

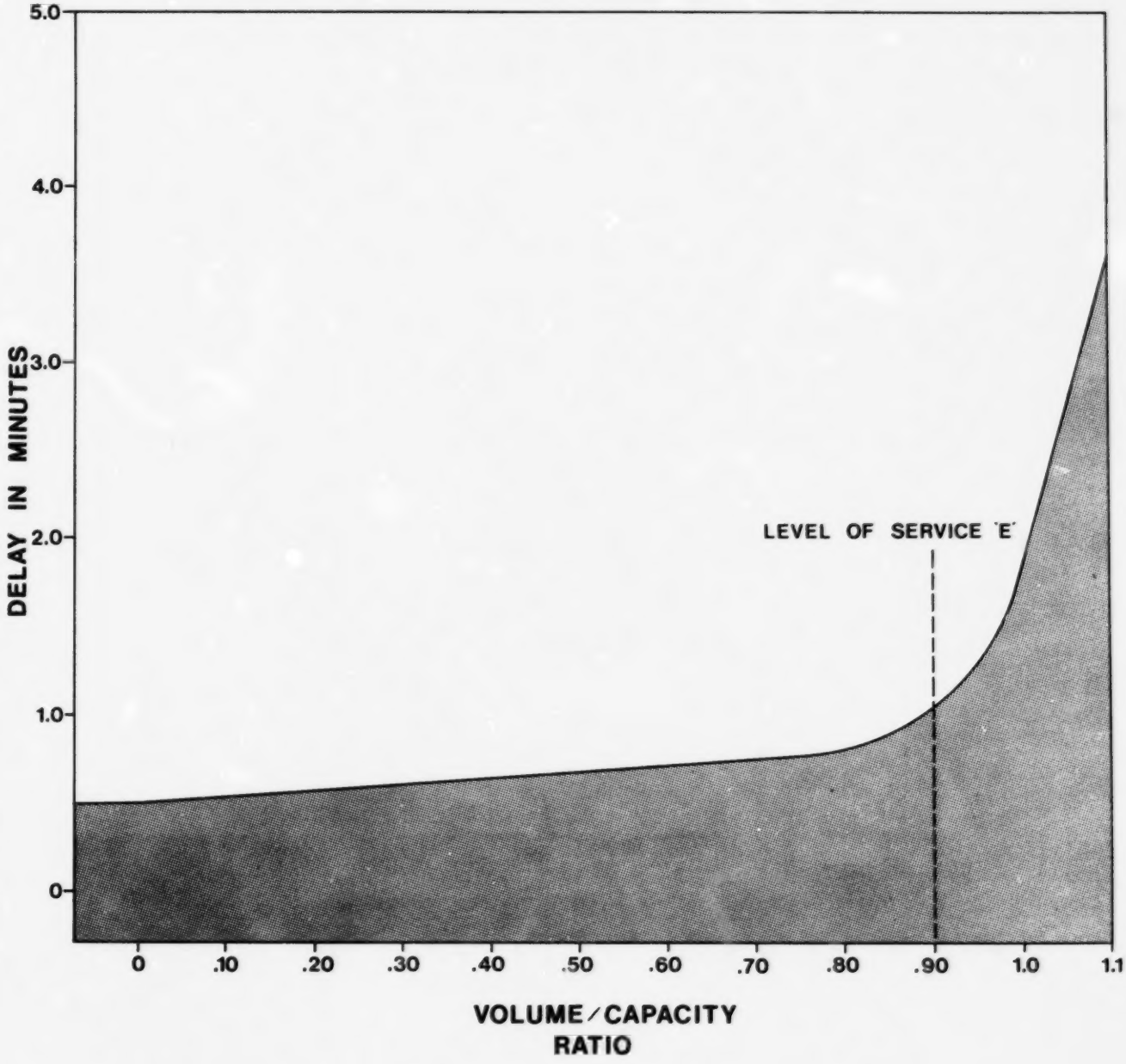


GROWTH IN AM PEAK HOUR TRAFFIC FLOWS ACROSS MAJOR SCREENLINES 1982-1993 Figure 8



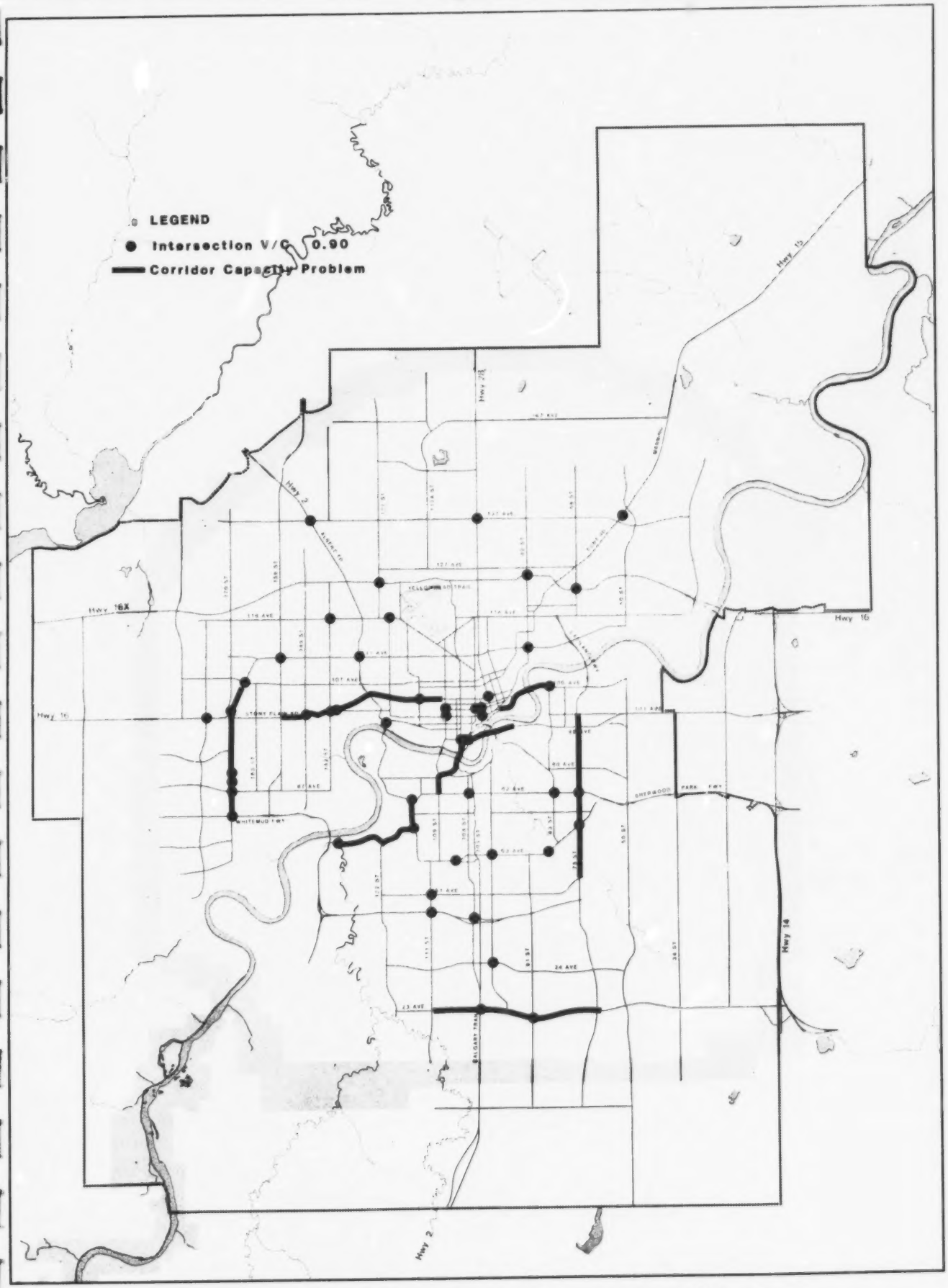
AM PEAK HOUR

GROWTH IN TRANSIT FLOWS ACROSS MAJOR SCREEN & CORDON LINES 1982-1993 Figure 9



RELATIONSHIP OF DELAY & VOLUME/CAPACITY RATIOS

Figure 10

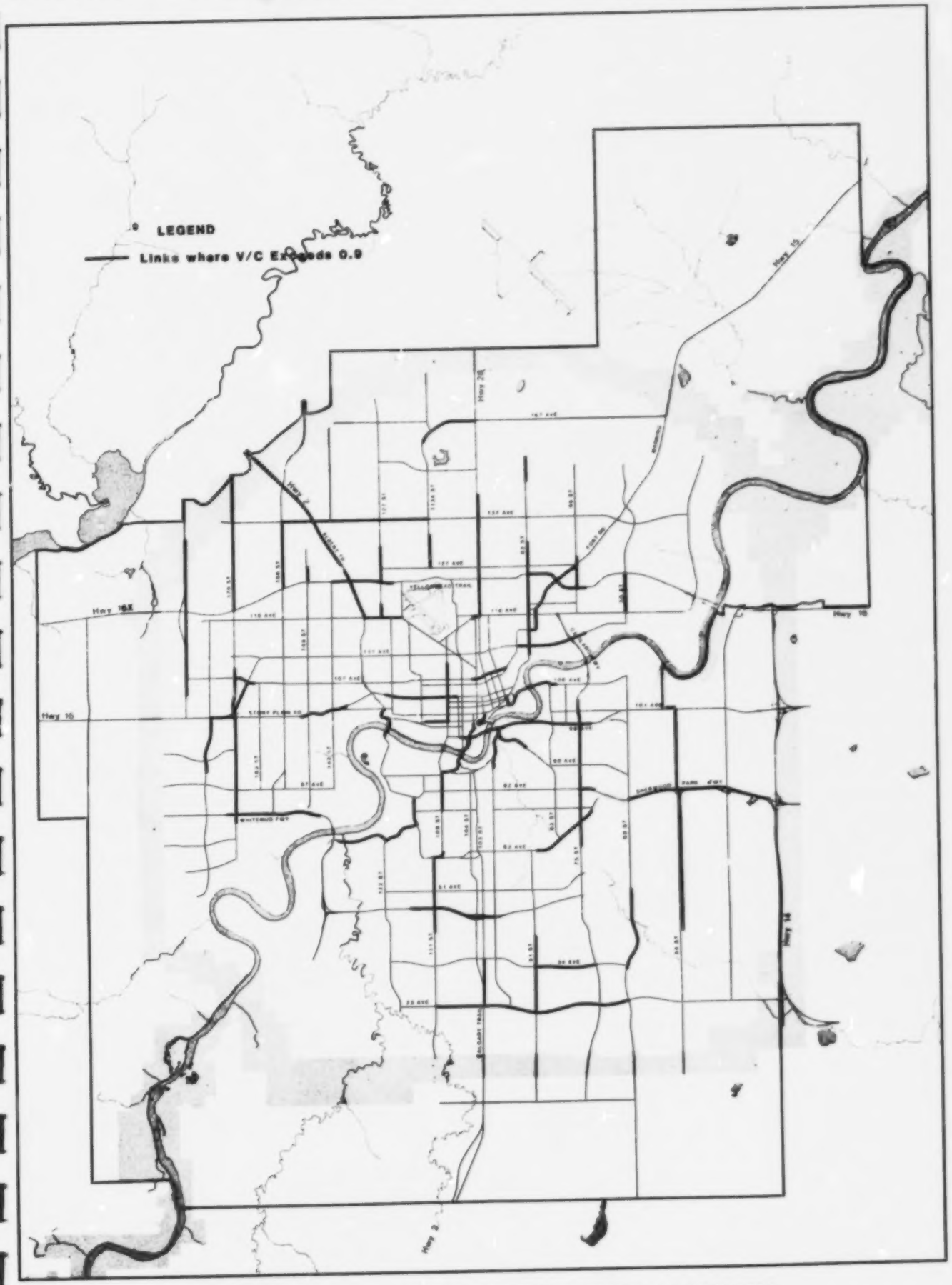


EXISTING ROADWAY CAPACITY PROBLEMS

Figure 11

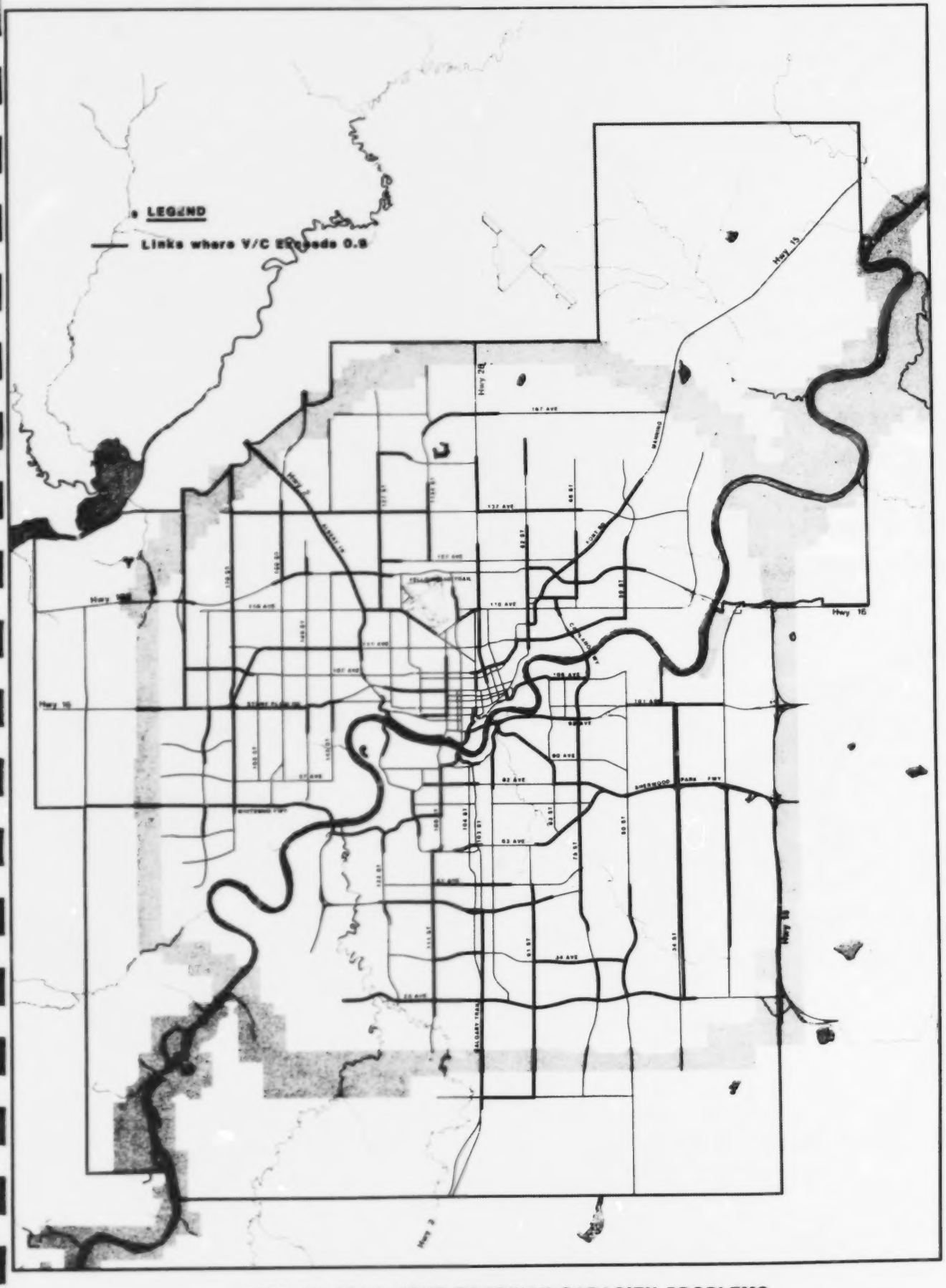
TRANSPORTATION MANAGEMENT DEPARTMENT
1982 TRANSIT PASSENGER VOLUMES
AM PEAK HOUR*
*PEAK FOR EACH LOCATION, NOT CONSTANT OVER ENTIRE CITY

Figure 12



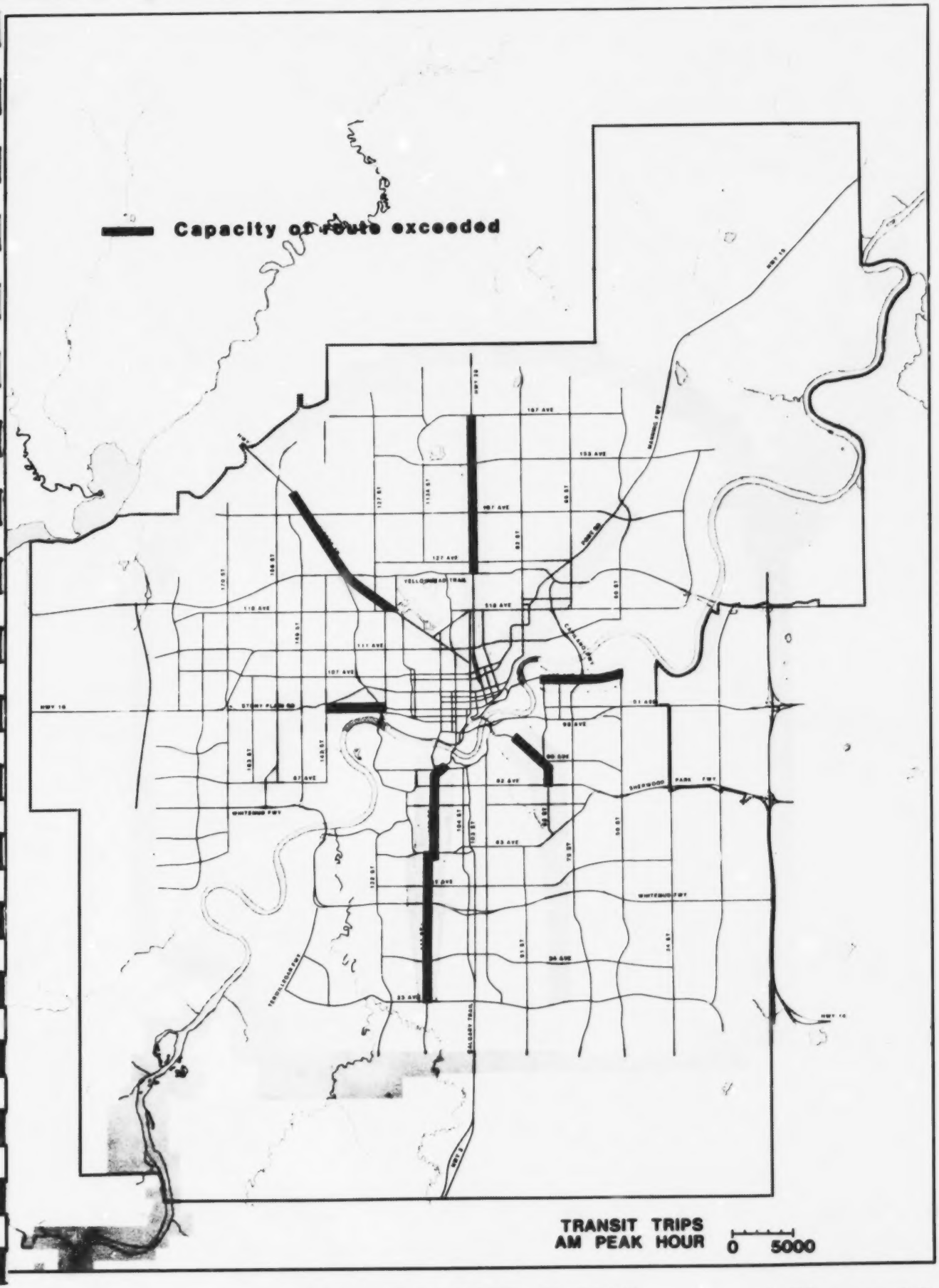
1988 AM PEAK HOUR ROADWAY CAPACITY PROBLEMS
BASED ON (1983 NETWORK)

Figure 13

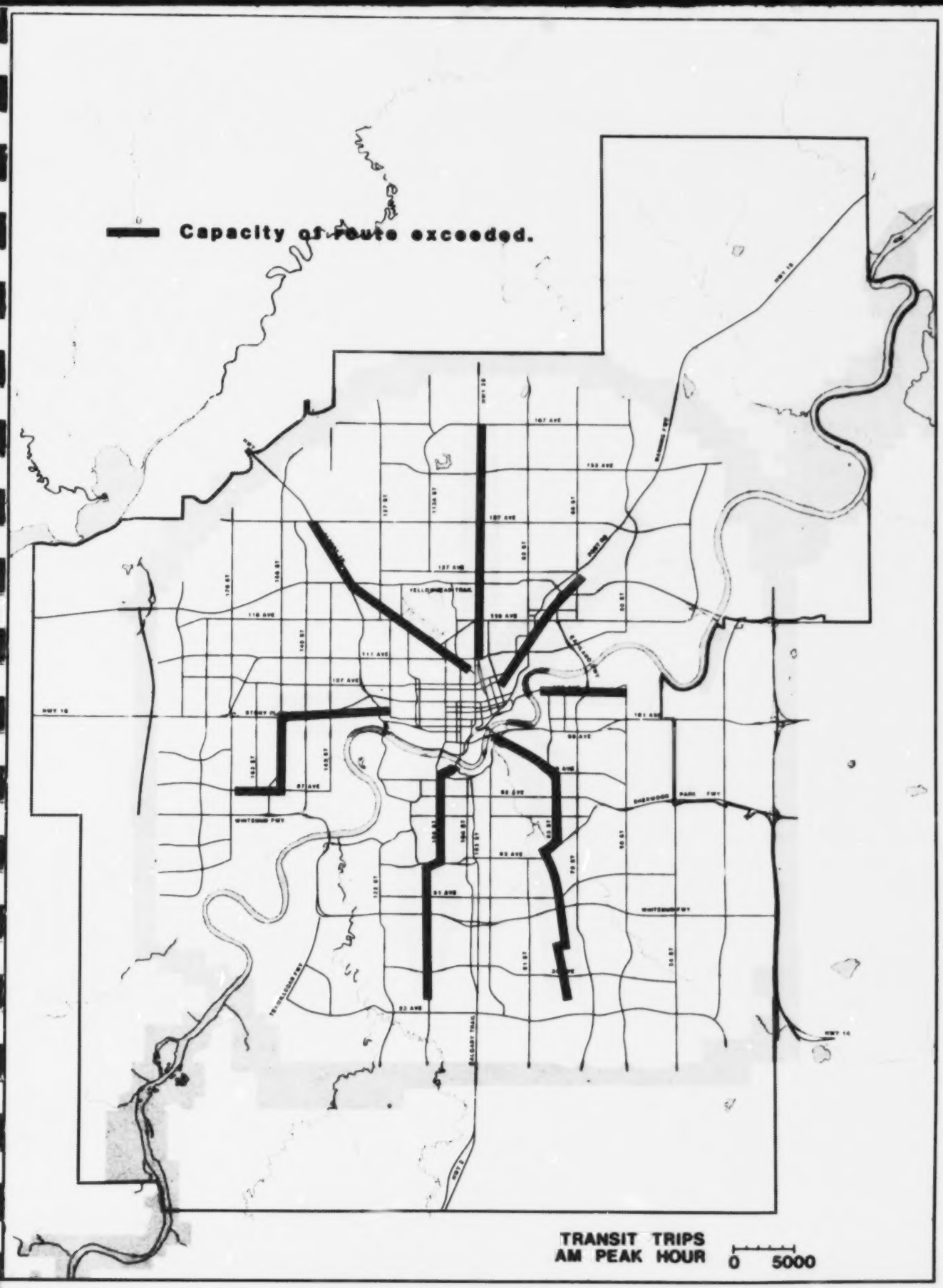


1993 AM PEAK HOUR ROADWAY CAPACITY PROBLEMS
BASED ON (1983 NETWORK)

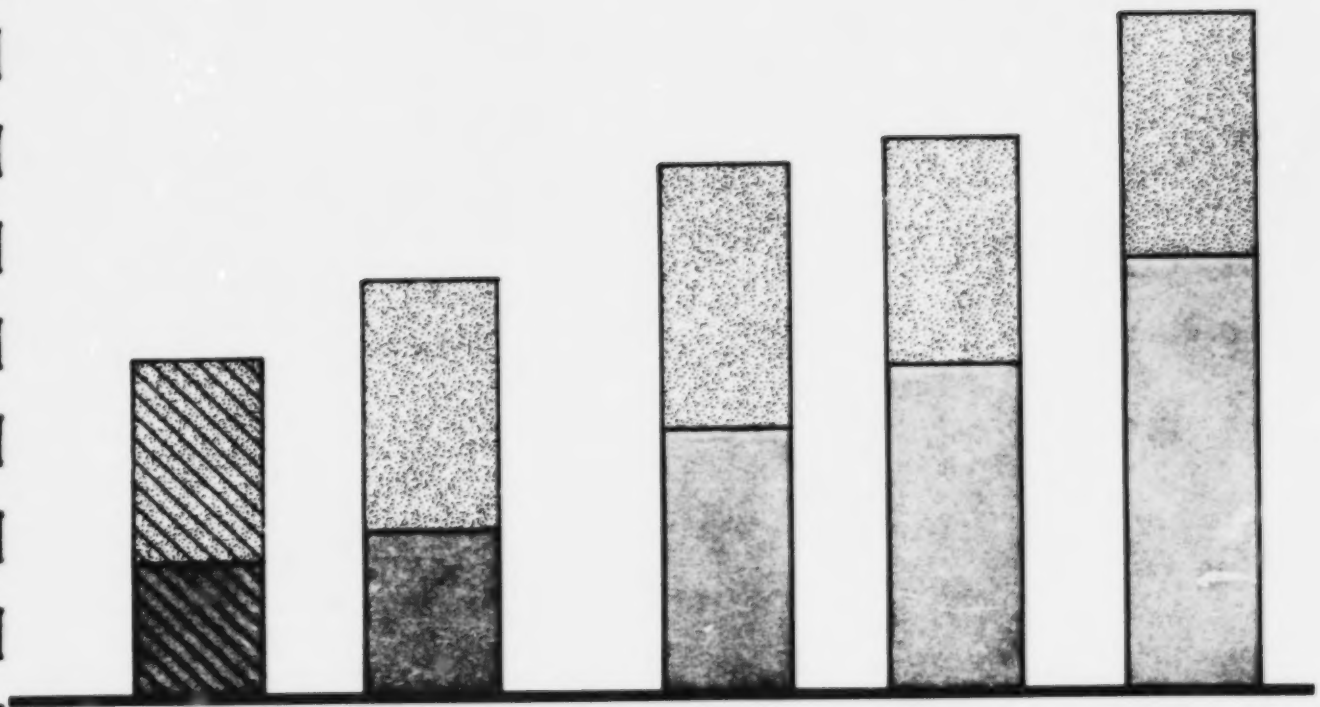
Figure 14



1988 TRANSIT FLOWS **Figure 15**



1993 TRANSIT FLOWS **Figure 16**



1982 DEMAND

EXISTING CAPACITY

ALT.1 BALANCED SYSTEM NO S.L.R.T.

ALT.2 MAXIMUM TRANSIT PRIORITY NO S.L.R.T

ALT.3 MAXIMUM TRANSIT PRIORITY WITH S.L.R.T. SEVERE AUTO RESTRAINT 5 CAR L.R.T.

LEGEND

AUTO

TRANSIT

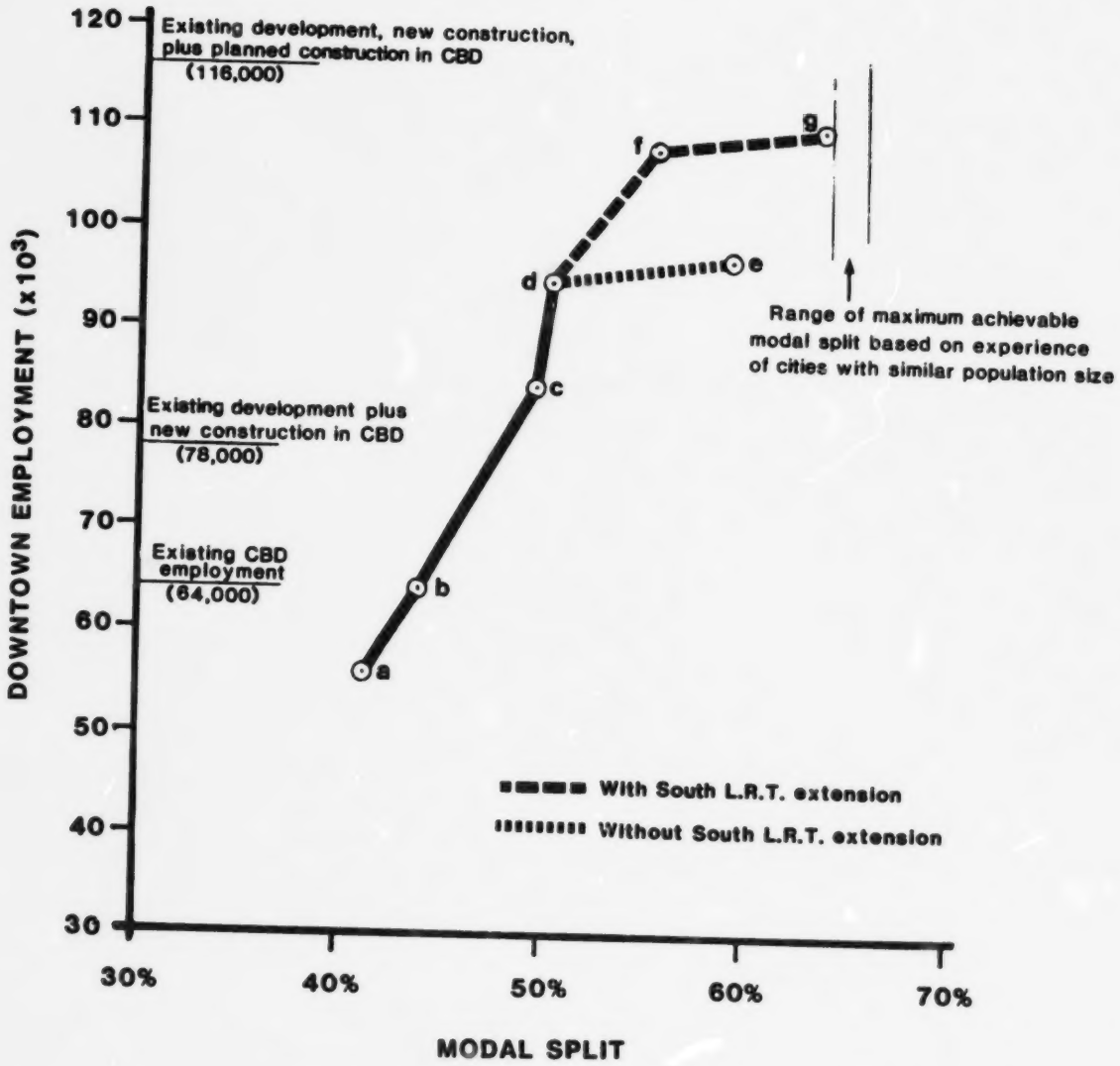
15,000 persons/hour

10,000 persons/hour

5,000 persons/hour

0

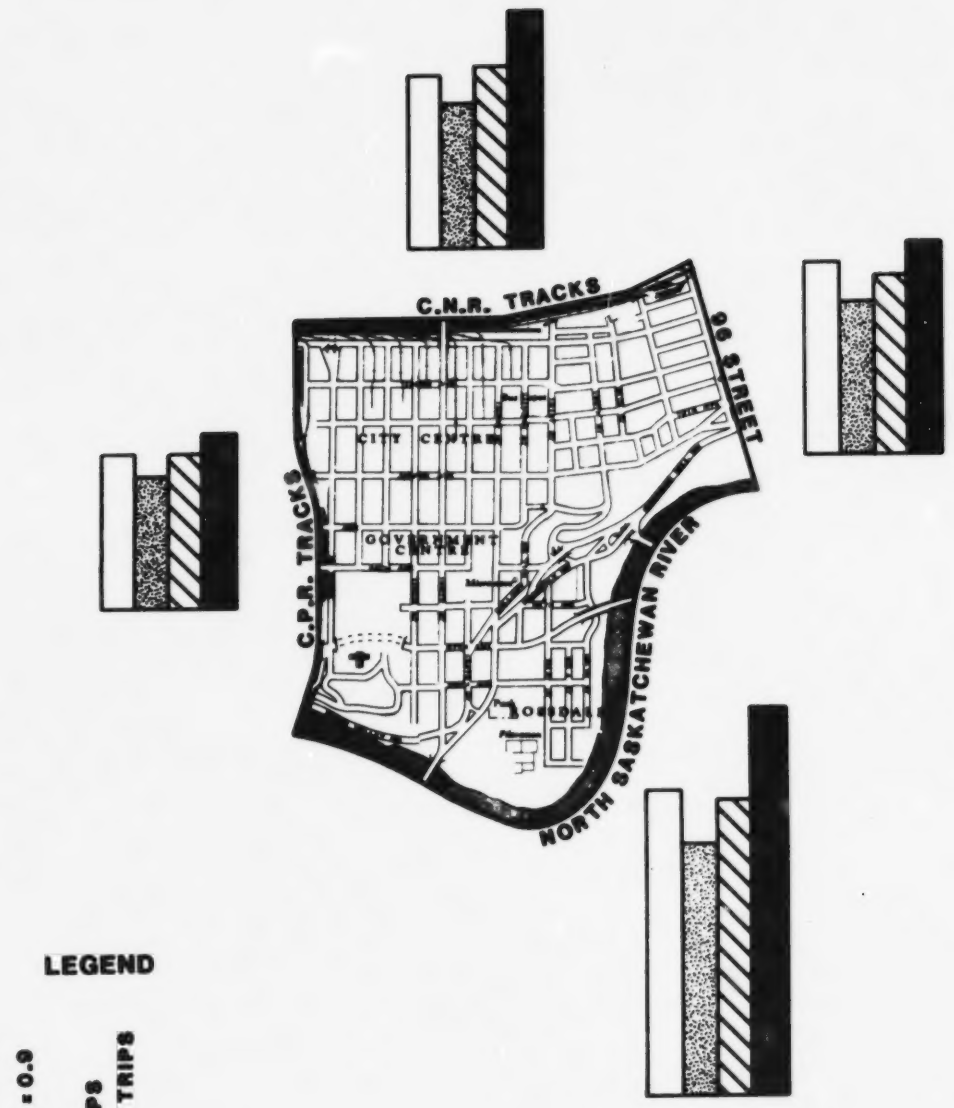
DOWNTOWN ACCESS CAPACITY WITH ALTERNATIVE TRANSPORTATION SYSTEMS Figure17



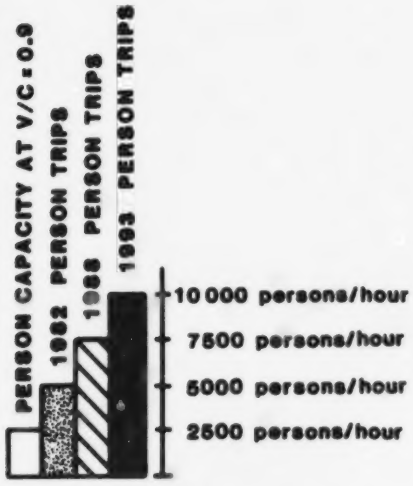
a 1977 actual
b 1982 actual
c Employment achievable with maximum utilization of existing transit and roadway capacity
d Employment achievable with access improvements to C.B.D.
e Employment achievable with severe auto restraint and maximization of transit priority measures within C.B.D. and surrounding areas
f Employment achievable with South L.R.T. and access improvements to C.B.D.
g Employment achievable with South L.R.T., severe auto restraint, and maximization of transit priority measures within C.B.D. and surrounding areas

DOWNTOWN EDMONTON EMPLOYMENT AND MODAL SPLIT

Figure 18

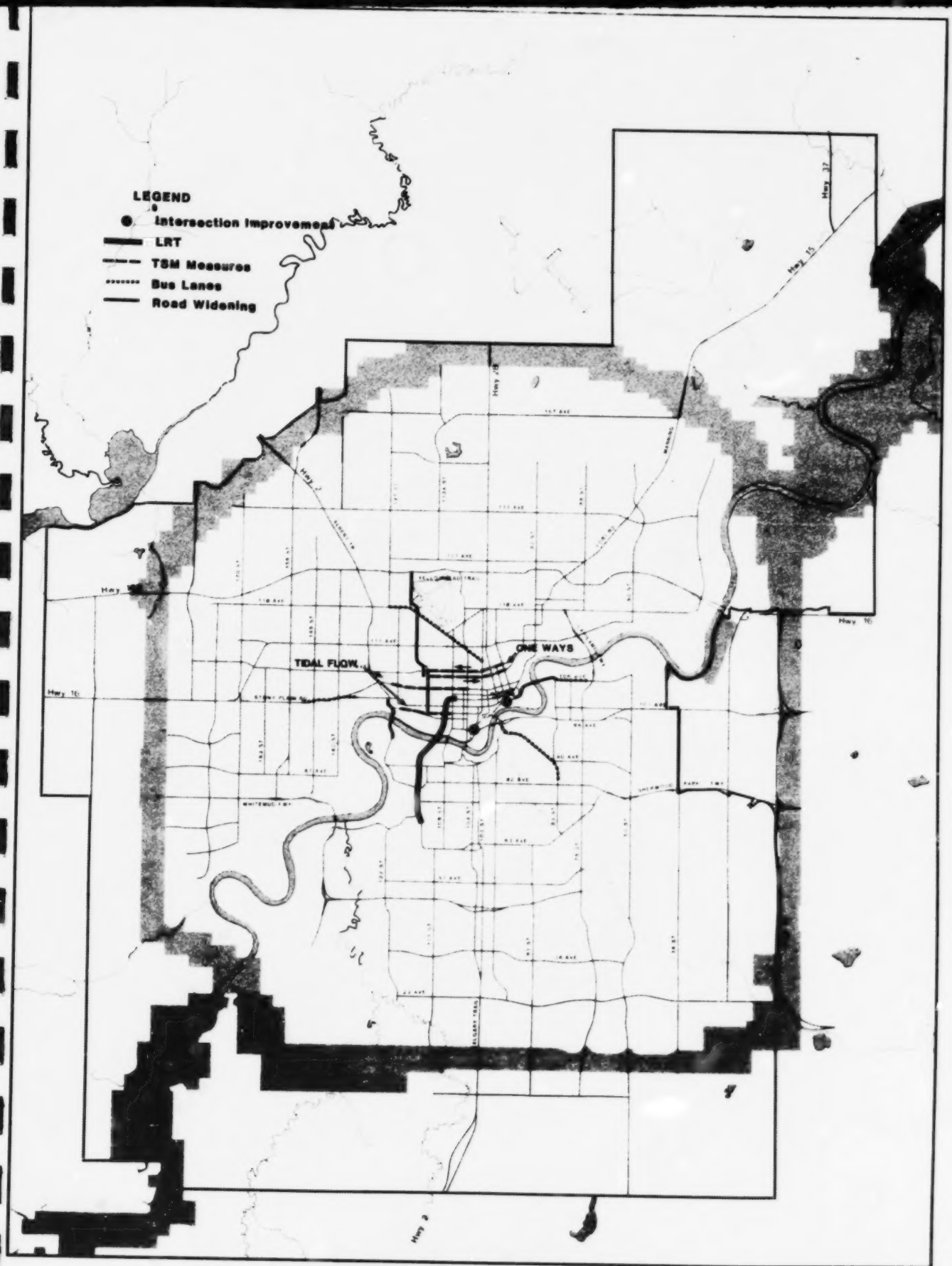


LEGEND



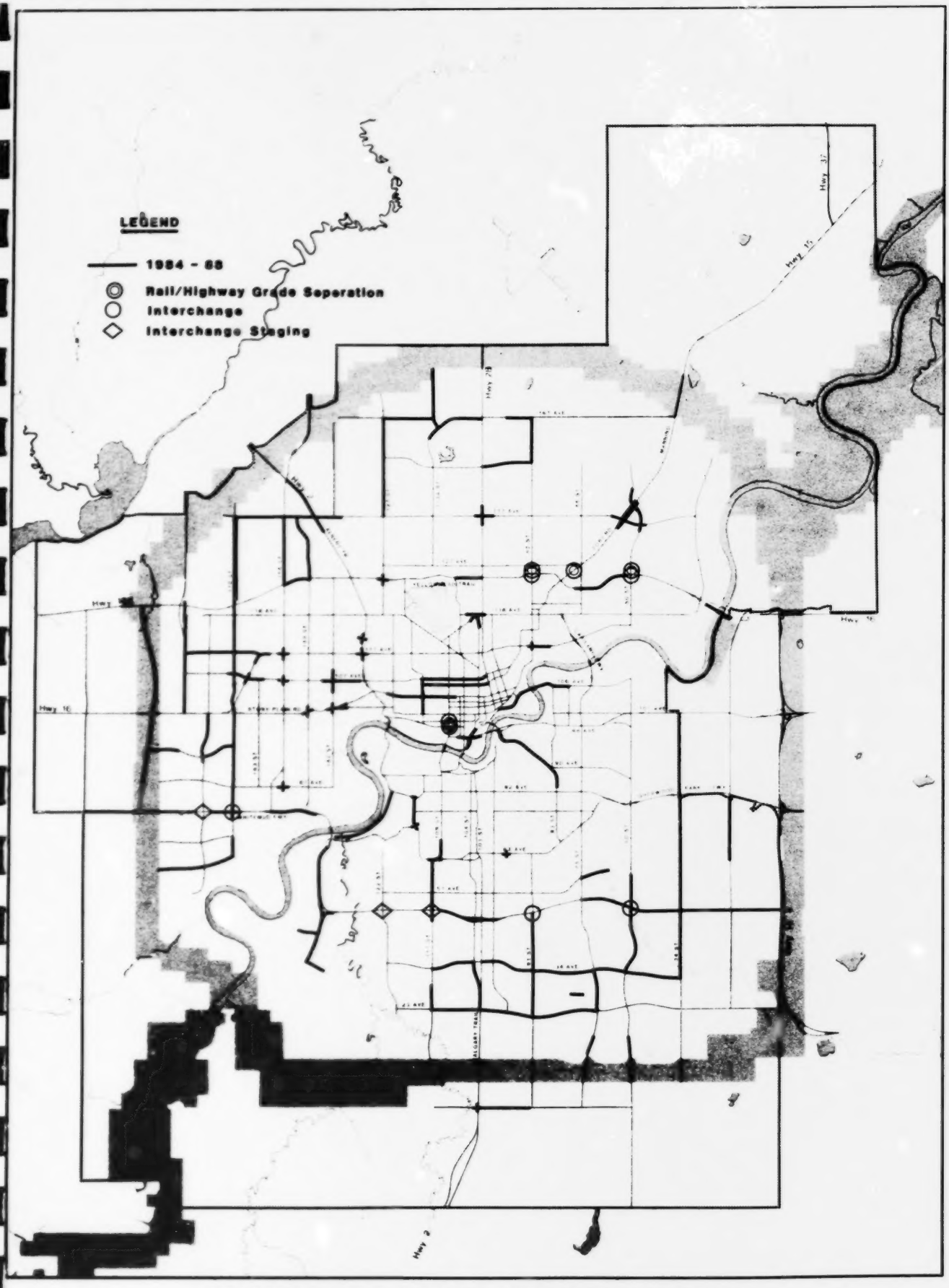
DOWNTOWN ACCESS CAPACITY & DEMAND BY SECTOR

Figure 19



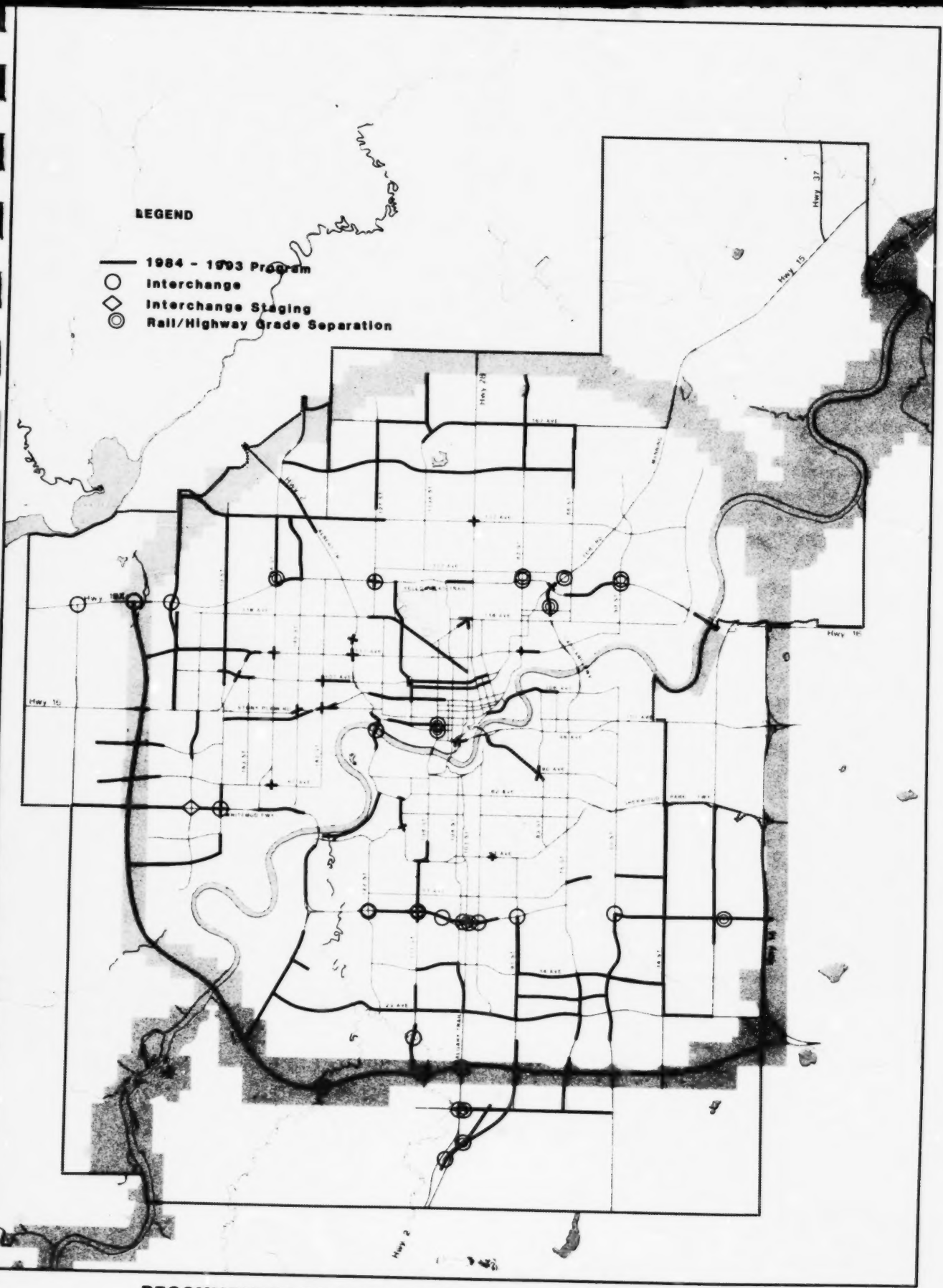
RECOMMENDED DOWNTOWN AREA TRANSPORTATION SYSTEM IMPROVEMENTS 1984-1993

Figure 20



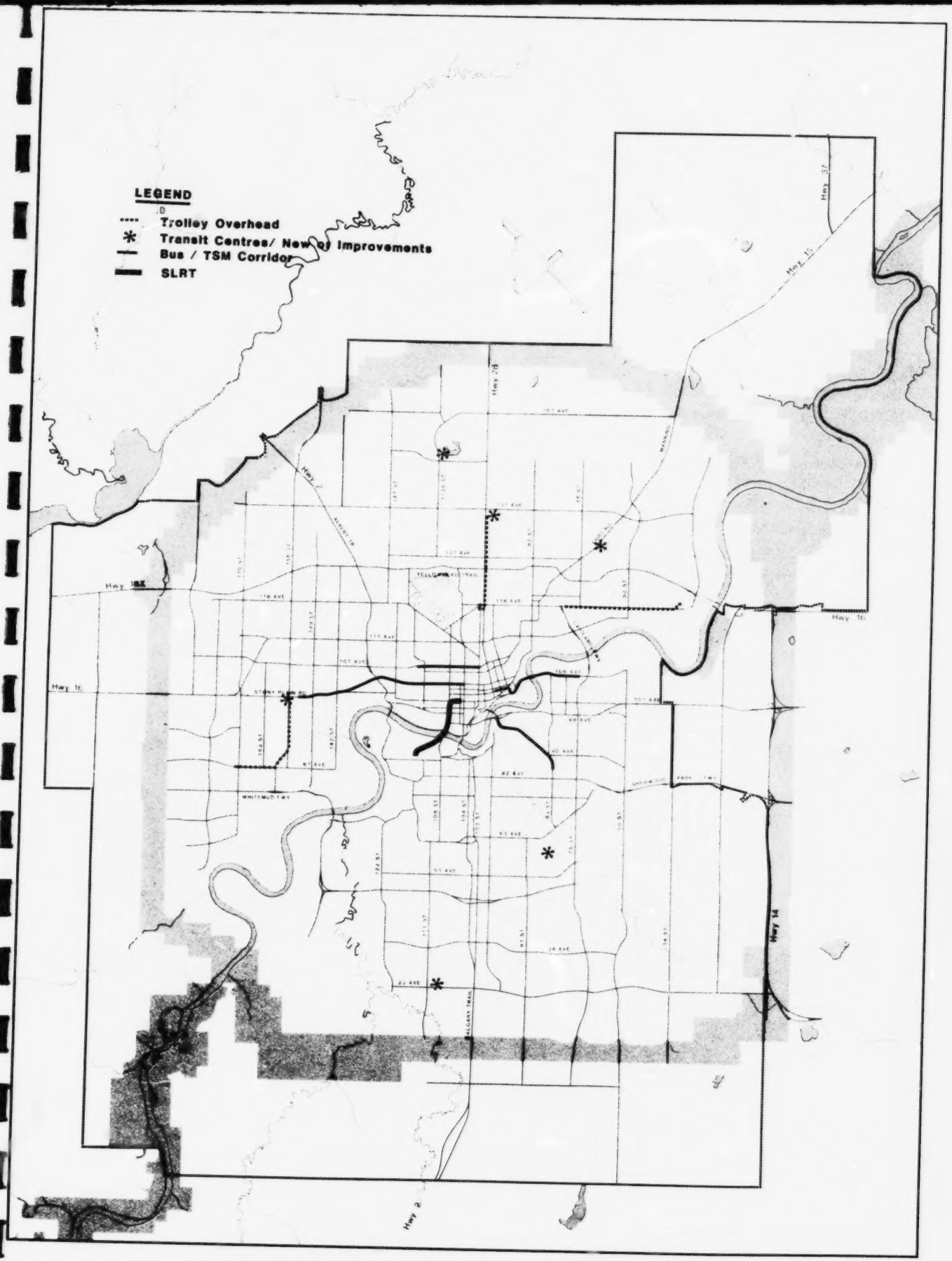
RECOMMENDED ROADWAY CONSTRUCTION PROGRAM
1984-1988
(BASED ON DEMAND)

Figure 21



RECOMMENDED ROADWAY CONSTRUCTION PROGRAM
1984-1993
(BASED ON DEMAND)

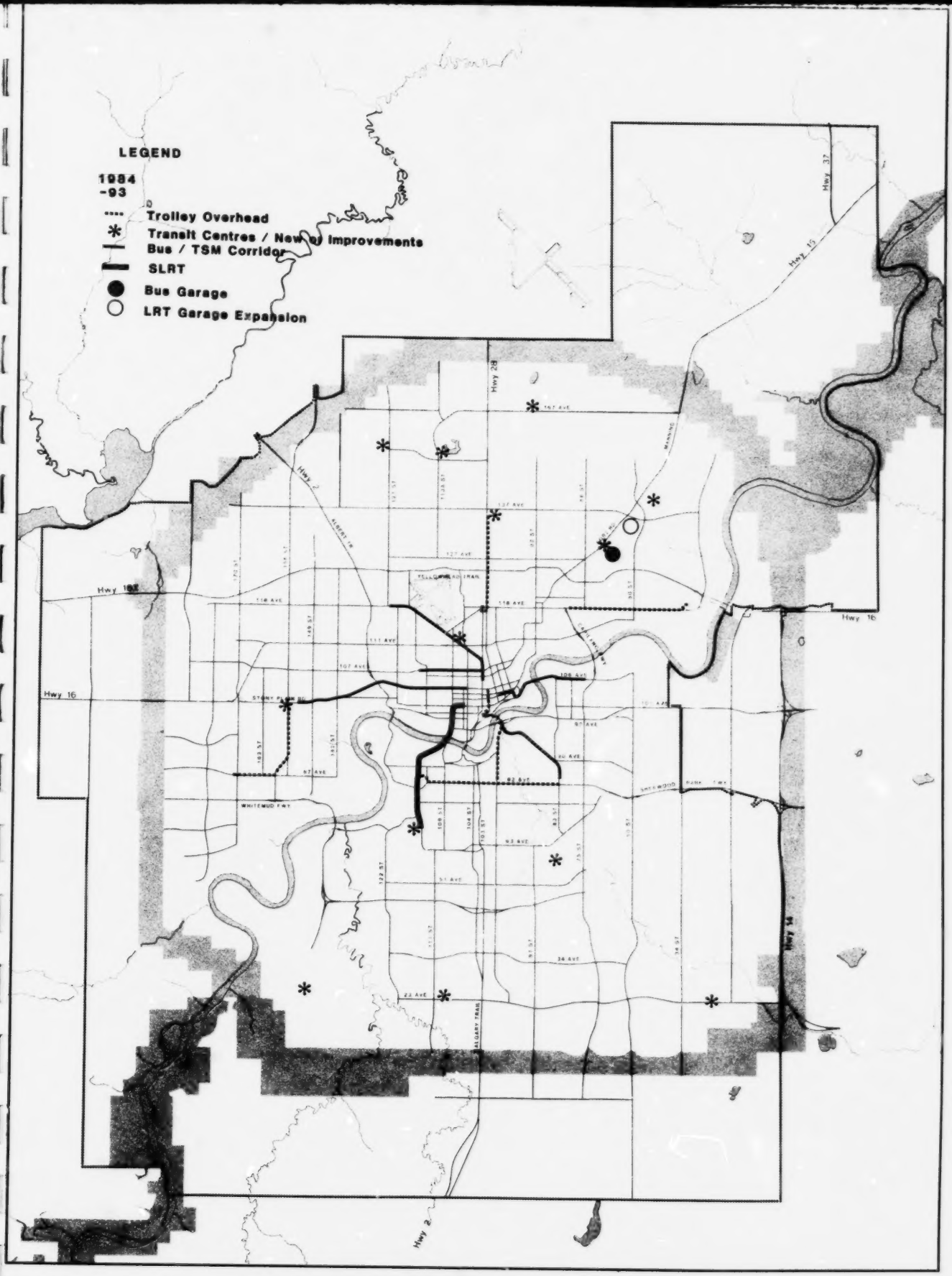
Figure 22



RECOMMENDED TRANSIT CAPITAL PROGRAM 1984-1988

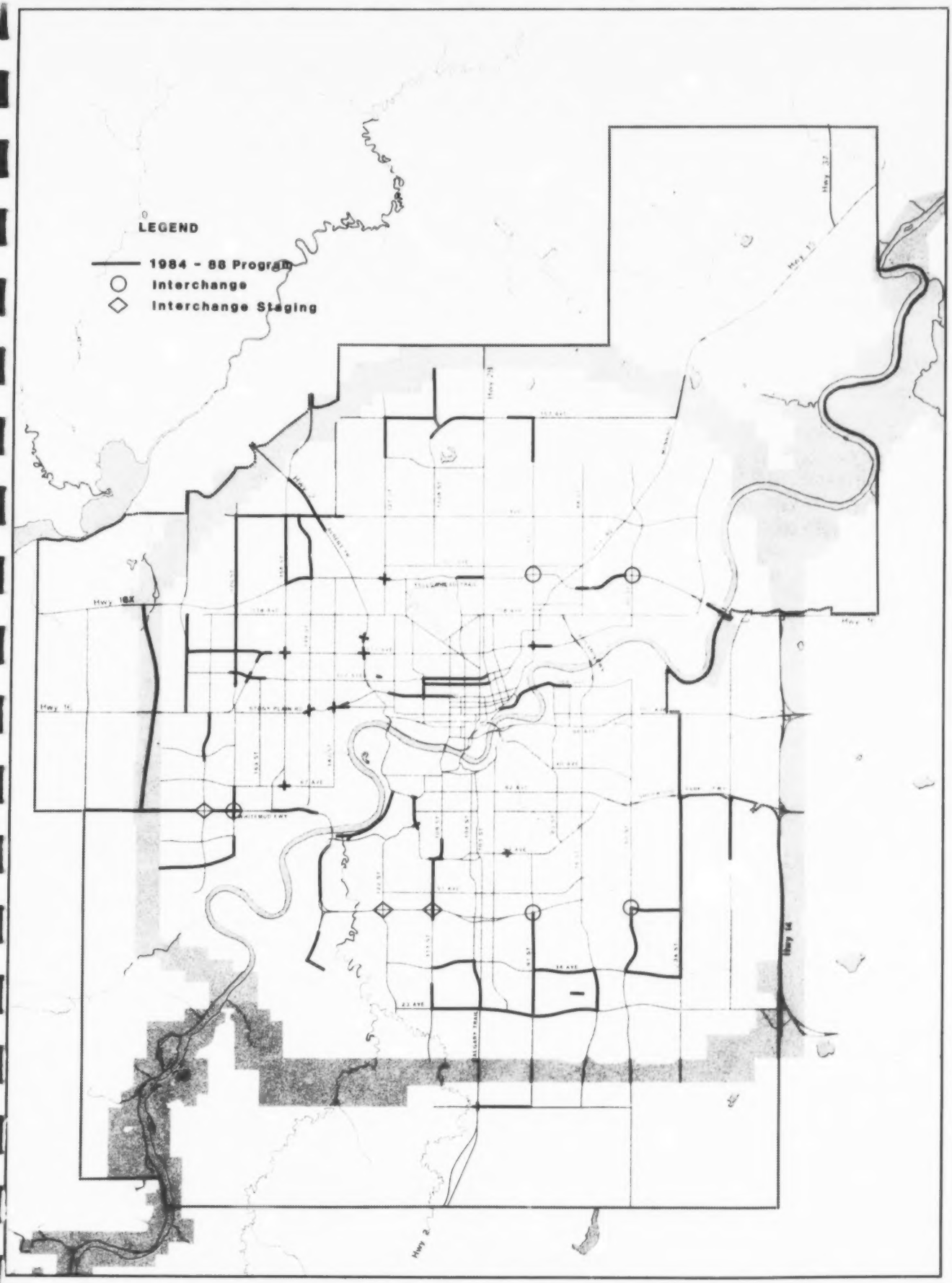
(BASED ON DEMAND)

Figure 23



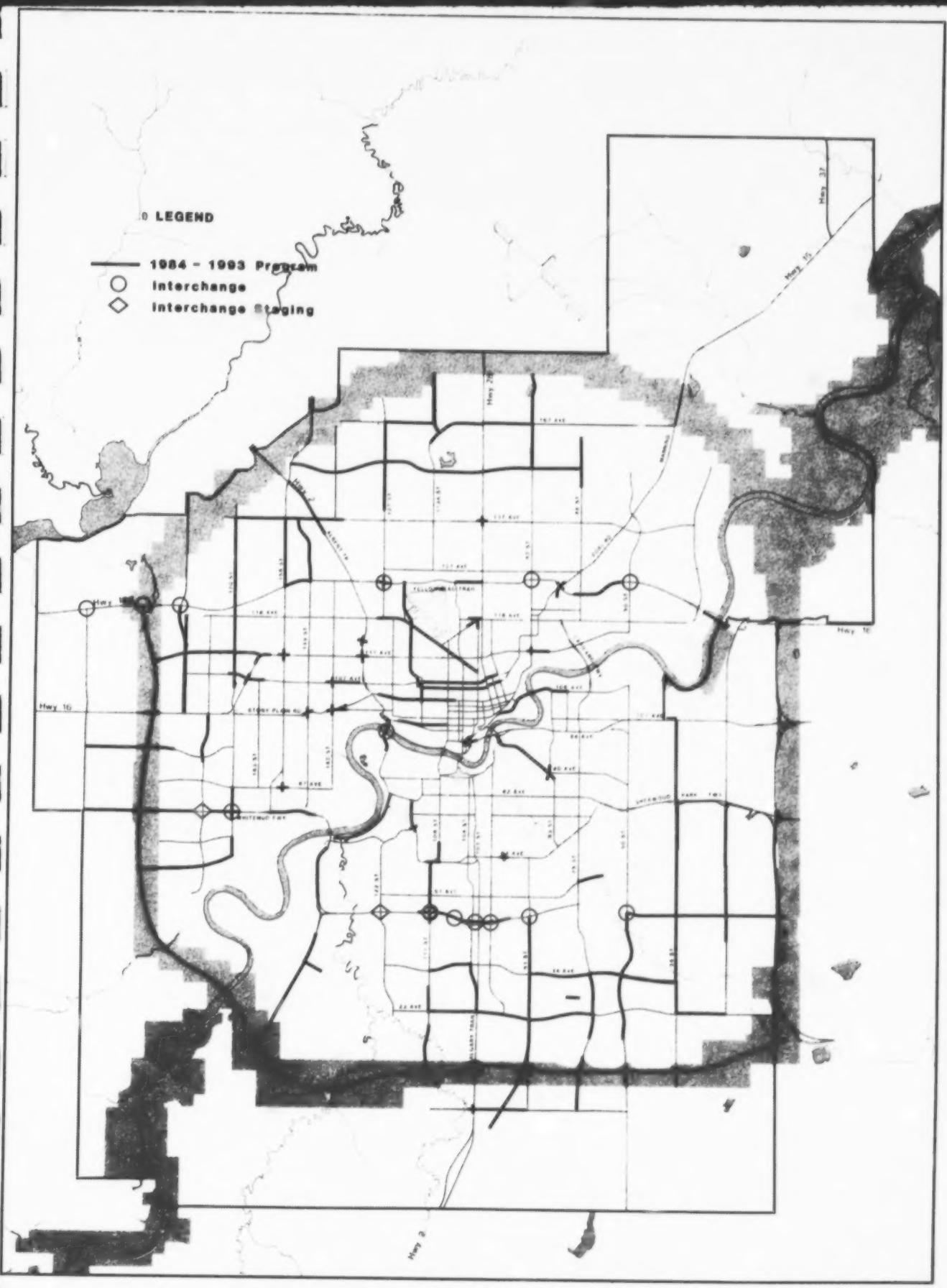
RECOMMENDED TRANSIT CAPITAL PROGRAM 1984-1993
(BASED ON DEMAND)

Figure 24



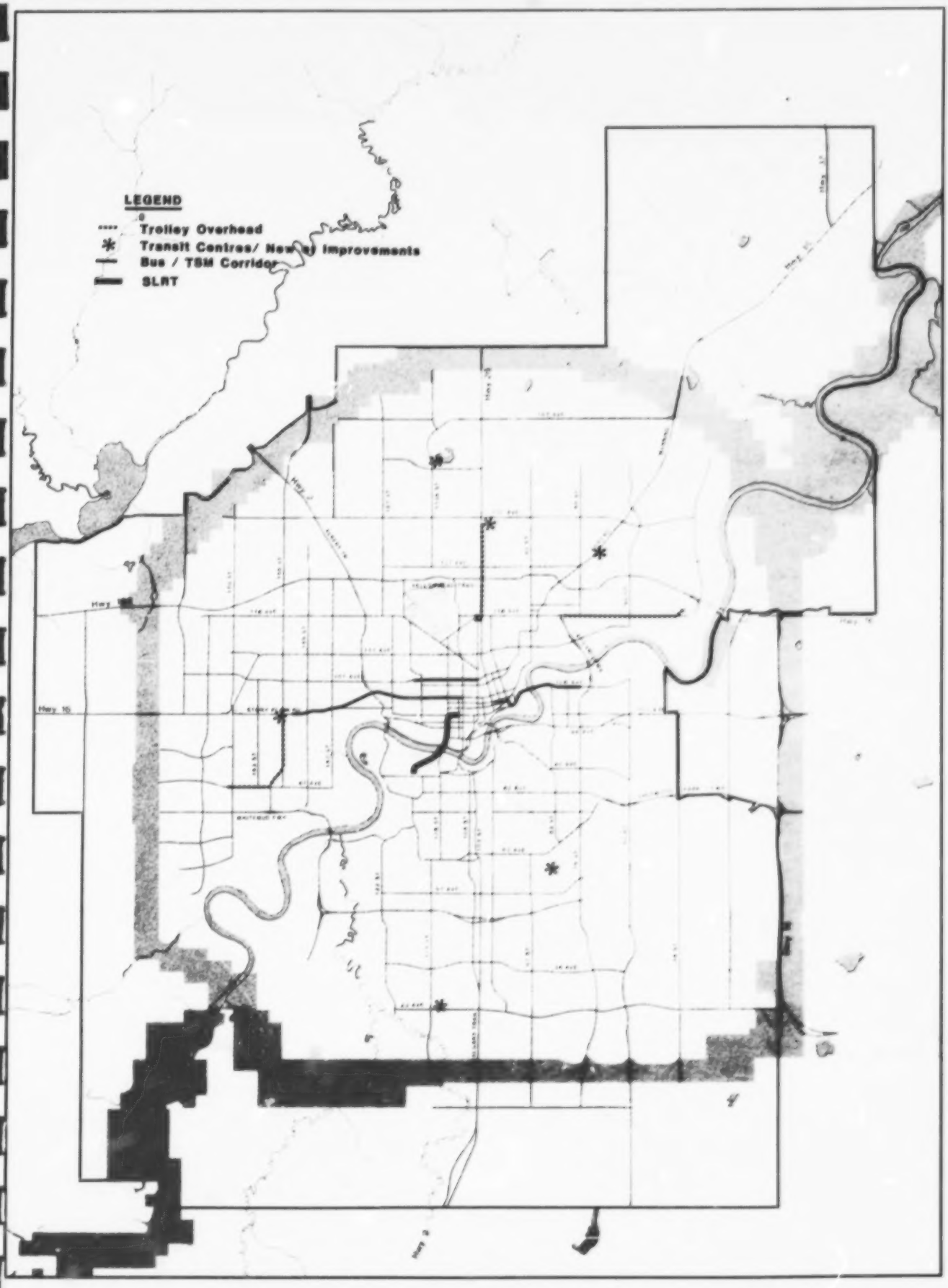
RECOMMENDED ROADWAY PROGRAM 1984-1988
(FINANCIALLY CONSTRAINED)

Figure 25



RECOMMENDED ROADWAY PROGRAM 1984-1993
(FINANCIALLY CONSTRAINED)

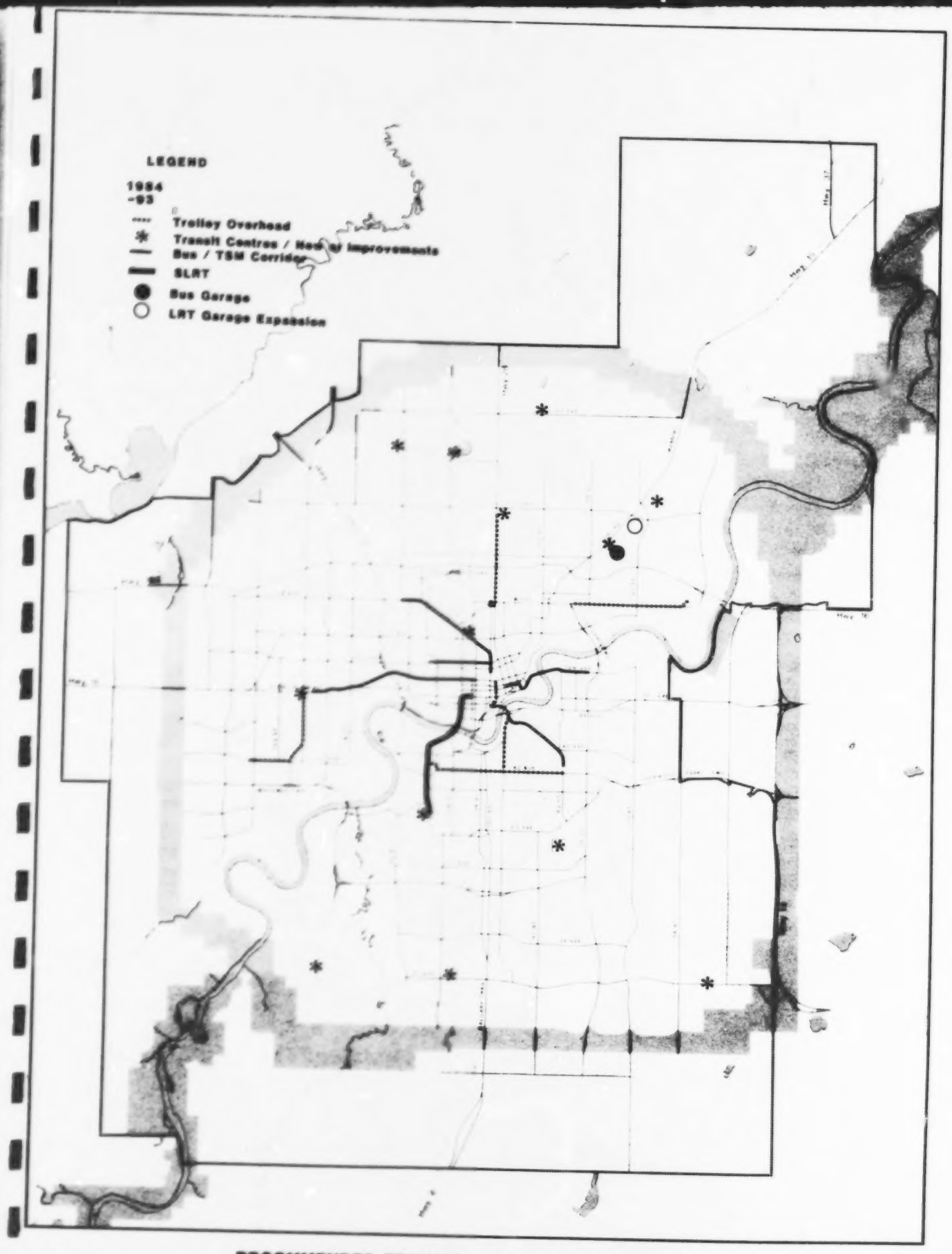
Figure 26



RECOMMENDED TRANSIT CAPITAL PROGRAM 1984-1988

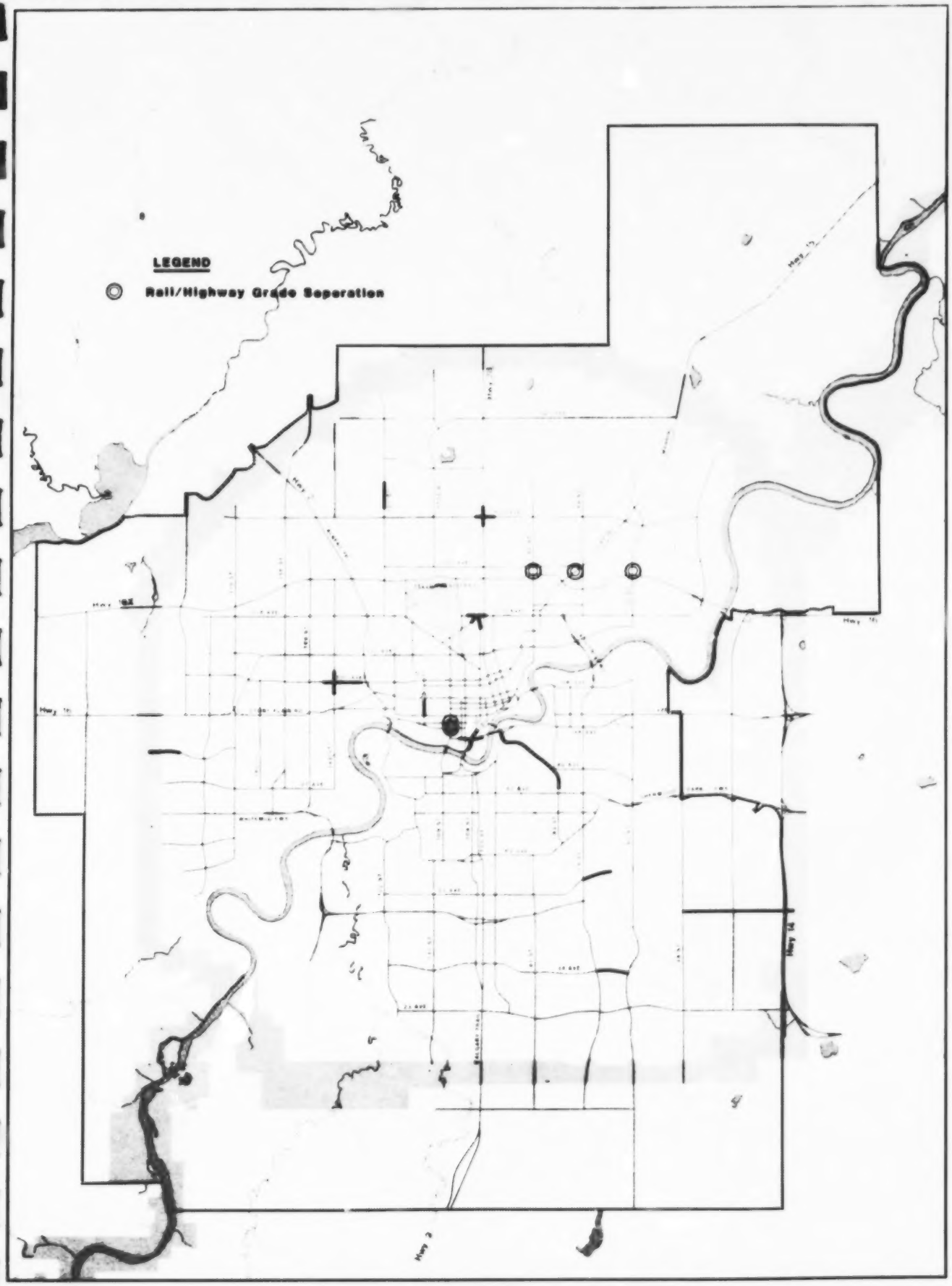
(FINANCIALLY CONSTRAINED)

Figure 27



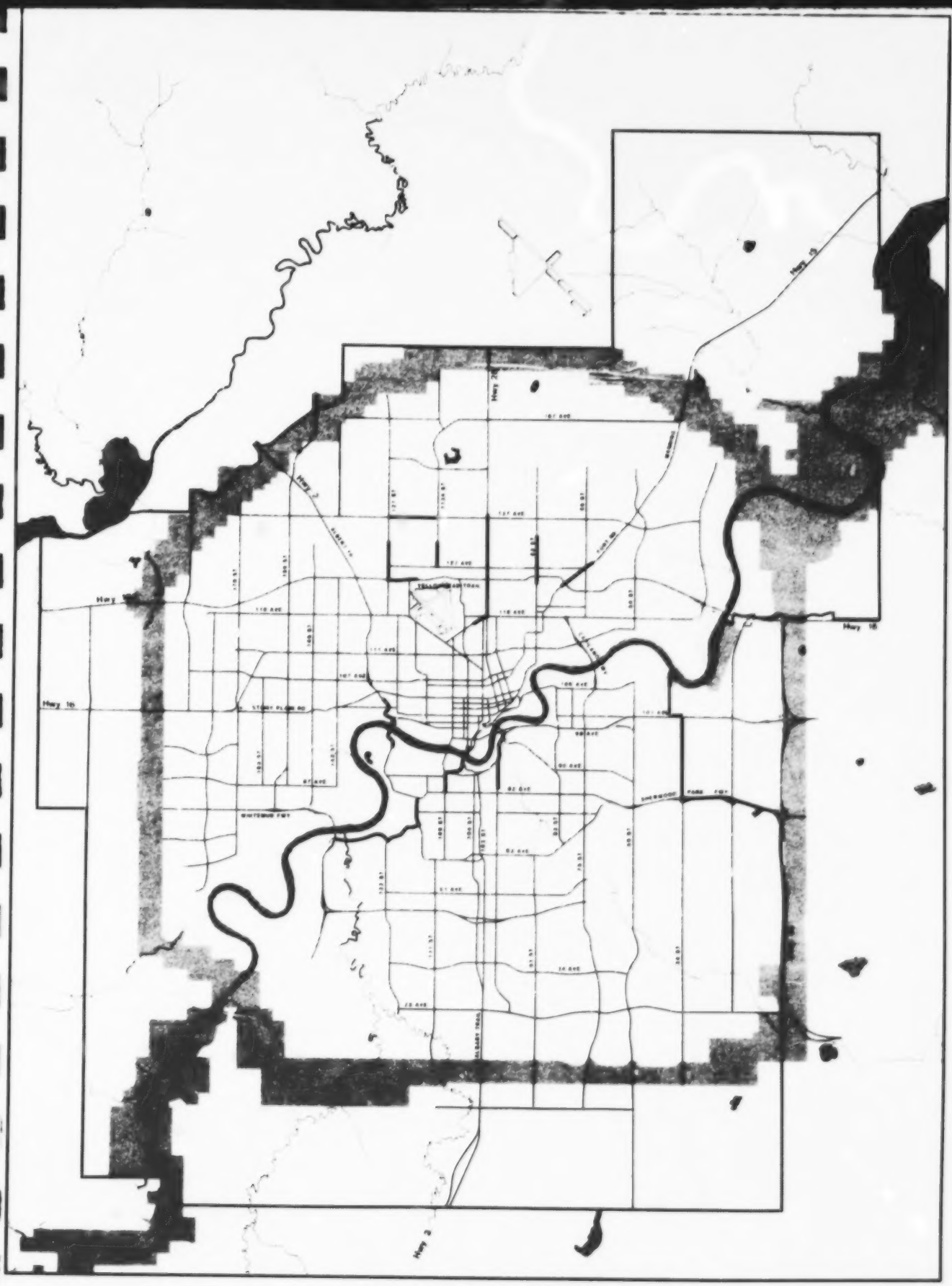
RECOMMENDED TRANSIT CAPITAL PROGRAM 1984-1993
(FINANCIALLY CONSTRAINED)

Figure 28



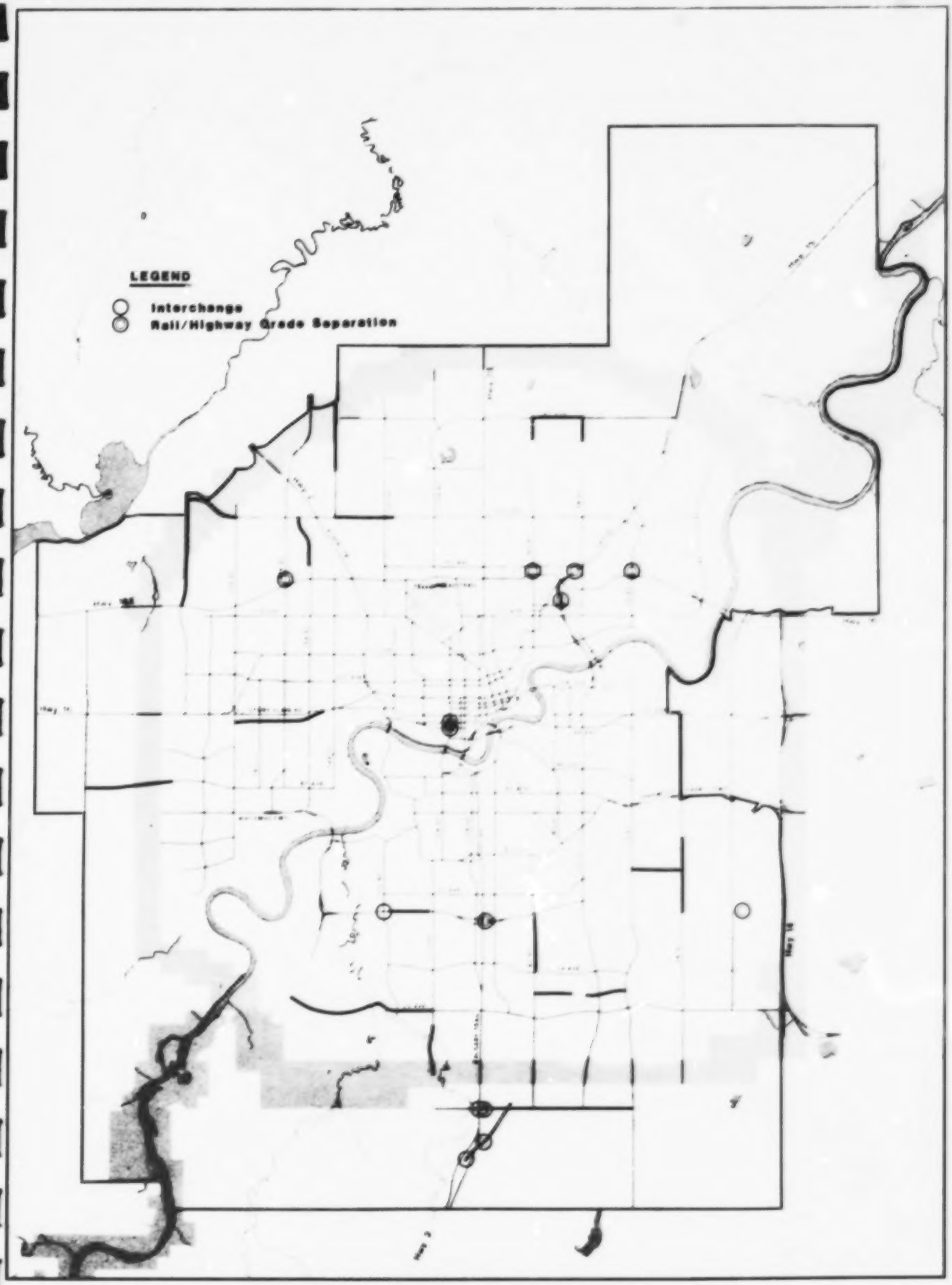
**ROADWAY IMPROVEMENTS EXCLUDED
FROM THE FIVE YEAR PROGRAM (1984-1988)
DUE TO FINANCIAL CONSTRAINTS**

Figure 29



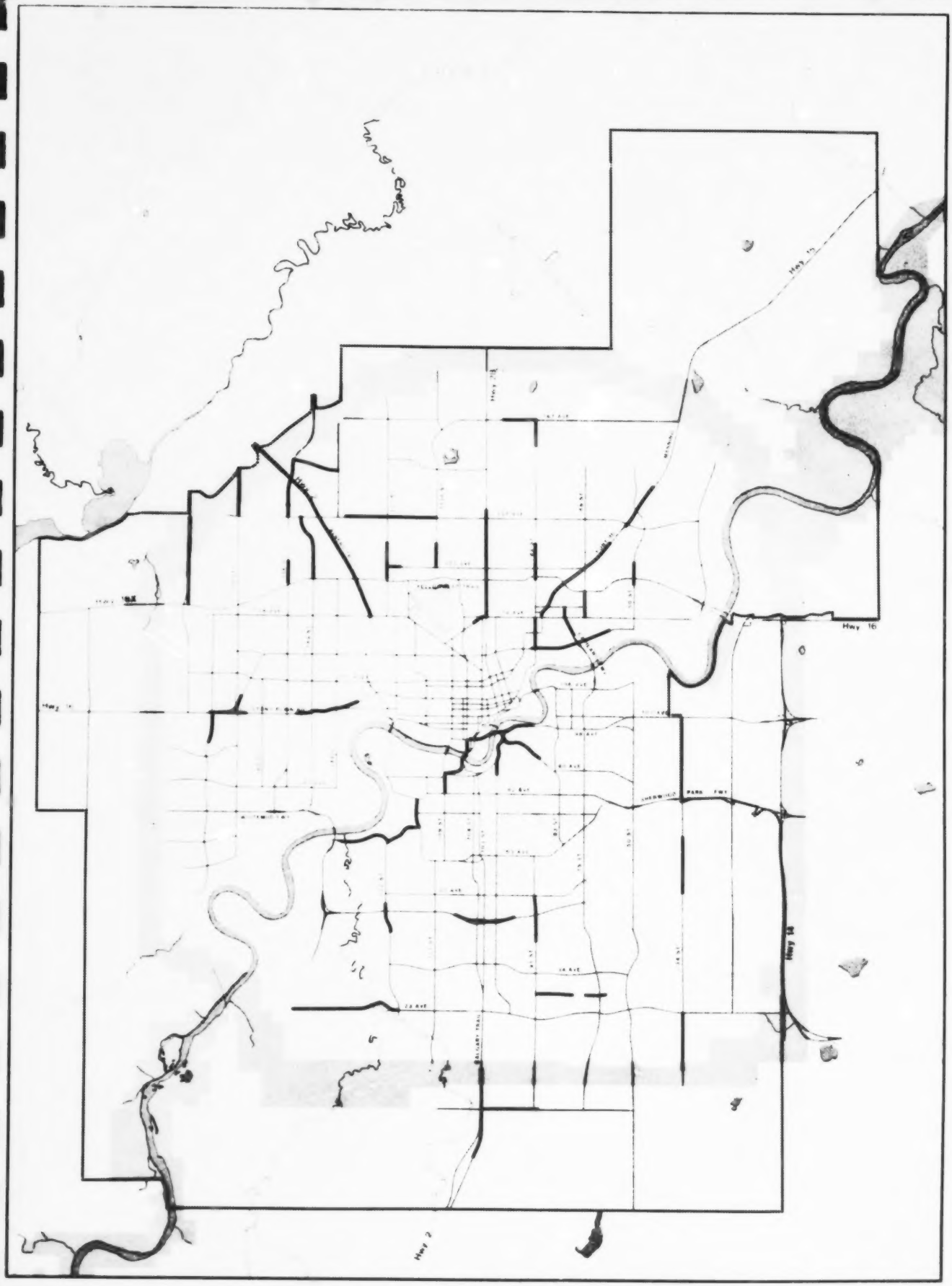
1988 CAPACITY PROBLEMS
1988 FINANCIALLY CONSTRAINED NETWORK

Figure 30



ROADWAY IMPROVEMENTS EXCLUDED FROM THE 1989 -1993 PROGRAM DUE TO FINANCIAL CONSTRAINTS

Figure 31



1993 ROADWAY CAPACITY PROBLEMS WITH THE FINANCIALLY CONSTRAINED CONSTRUCTION PROGRAM 1984 - 1993

Figure 32

APPENDIX 1

POPULATION AND EMPLOYMENT BY AREA

CITY OF EDMONTON - PROPOSED LAND USE

TRANSPORTATION DISTRICT NO.	DESCRIPTION OF AREA	POPULATION					EMPLOYMENT			
		1976	1981*	1988	1993 LOW	1993 HIGH	1981	1988	1993 LOW	1993 HIGH
19	Lake District	230	132	8,022	15,122	26,822	6	104	1,306	1,806
20	S.E. Industrial	972	1,933	1,933	1,933	1,933	7,839	10,839	12,439	16,439
21	Meadows	0	0	5,000	10,800	19,800	0	600	700	1,000
22	Downtown Fringe	53,142	46,664	49,059	50,059	52,559	30,139	34,130	35,639	38,137
23	Kaskitayo	21,483	34,188	40,651	44,351	50,051	2,289	3,289	3,289	3,289
24	Daon 80	-	854	854	854	8,754	100	1,100	2,050	4,150
25	Heritage Valley E.	-	309	309	309	309	50	50	50	50
26	Heritage Valley W.	-	300	300	300	300	50	50	50	50
27	Lewis Farms	-	567	567	2,067	6,667	50	50	50	150
28	Winterburn	-	2,123	2,123	2,123	2,123	950	1,950	3,150	5,150
29	Land Bank	-	90	431	431	431	40	40	40	40
30	N.E. Edmonton	-	2,911	2,911	2,911	2,911	900	900	900	900
31	Clover Bar	-	0	4	54	54	2,450	2,450	2,600	3,100
CITY TOTAL		463,063	525,247	612,434	655,384	730,384	281,551	343,249	368,401	408,799

*1981 population for areas within 1982 City boundaries are from the 1982 Edmonton Census.

CITY OF EDMONTON - PROPOSED LAND USE

DESCRIPTION OF AREA	1976	POPULATION 1981*	1988	1993 LOW	1993 HIGH	EMPLOYMENT 1981	1988	1993 LOW	1993 HIGH
County of Strathcona	-	57,990	77,274	83,504	101,964	18,005	26,810	27,710	29,460
Refinary Row		(0)	(0)	(0)	(0)	(5,231)	(8,511)	(8,911)	(9,711)
Sherwood Park		(30,660)	(41,170)	(45,400)	(60,360)	(4,120)	(6,195)	(6,295)	(6,495)
Fort Saskatchewan		(13,320)	(18,074)	(19,574)	(22,574)	(7,440)	(10,940)	(11,340)	(12,090)
County of Leduc		18,660	29,097	31,697	36,197	9,925	15,630	17,130	20,630
Leduc/Nisku		(11,950)	(15,910)	(17,410)	(20,410)	(7,250)	(12,685)	(14,185)	(17,485)
County of Parkland		25,120	34,190	36,690	41,190	5,449	10,859	12,259	15,459
Spruce Grove/Stony Plain		(14,790)	(20,780)	(22,680)	(26,430)	(3,575)	(6,760)	(7,760)	(9,760)
M.D. of Sturgeon		16,990	21,895	22,895	23,945	3,620	3,750	3,750	4,300
City of St. Albert		31,180	42,510	45,510	51,410	4,550	7,500	8,000	9,000
TOTAL		149,940	204,966	220,296	254,706	41,540	64,549	68,849	78,849

NOTE: County totals include the numbers in brackets for each municipality.

CITY OF EDMONTON - PROPOSED LAND USE

TRANSPORTATION DISTRICT NO.	DESCRIPTION OF AREA	POPULATION					EMPLOYMENT			
		1976	1981*	1988	1993 LOW	1993 HIGH	1981	1988	1993 LOW	1993 HIGH
1	Downtown Core	8,047	6,500	7,091	7,091	7,091	60,000	75,000	80,000	90,000
2	University	19,956	15,301	19,071	19,071	19,071	33,377	35,877	36,877	37,877
3	Southgate	35,754	33,542	34,430	34,430	34,430	10,209	14,709	16,209	16,709
4	Riverbend	5,782	6,608	11,622	14,622	21,522	377	477	577	677
5	Jasper Place	69,948	61,518	60,645	60,645	60,645	10,875	10,875	11,875	12,875
6	West J.P.	8,052	27,027	39,789	44,789	52,289	3,314	5,114	5,614	6,714
7	N.W. Industrial	424	297	268	268	268	27,200	37,700	38,700	40,700
8	North Central	42,837	38,882	38,987	38,987	38,987	22,991	23,411	23,411	23,711
9	Calder	28,385	24,148	24,103	24,103	24,103	4,625	4,625	4,625	4,625
10	Londonderry	54,935	51,553	50,995	50,995	50,995	5,199	5,799	5,799	5,799
11	Beverly	29,117	26,757	28,182	28,182	28,182	7,011	7,011	7,011	7,011
12	Clareview	2,957	19,593	26,658	29,258	32,458	1,575	3,175	3,675	4,675
13	Capilano	40,256	36,239	35,700	35,700	35,700	8,366	10,336	10,686	11,186
14	Bonnie Doon	24,261	21,122	20,946	20,946	20,946	25,559	27,559	27,759	27,759
15	Millwoods	11,967	43,999	69,013	77,013	84,013	3,485	4,885	5,385	5,885
16	South Industrial	100	58	48	48	48	5,053	11,153	14,353	18,353
17	Mistatim	0	0	162	162	162	6,100	8,100	11,600	17,200
18	Castle Downs	4,458	22,032	32,560	37,760	46,760	1,482	1,882	1,982	2,782

APPENDIX 2

ROADWAY CAPITAL PROGRAM

1984 - 1993

TABLE A-1

RECOMMENDED ROADWAY PROGRAM, 1984

(BASED ON 1983 CONSTANT DOLLARS)

LINK	PROPOSED ROAD IMPROVEMENT	LENGTH (KM)	COST ($MILLION)
A) MAJOR CONTINUOUS CORRIDOR			
Yellowhead Trail Clover Bar Bridge	Commence construction of a new three lane westbound bridge.	-	11.4 11.4
B) TRANSPORTATION SYSTEMS MANAGEMENT			
106 Avenue 117 Street - 97 Street	Reconstruct existing road.	2.4	1.1
111 Avenue 156 Street Intersection	North/South left turn bays.	-	0.2
87 Avenue 156 Street Intersection	East/West left turn bays.	-	0.2
61 Avenue 109 Street - 111 Street Connection	Reconstruct as a six lane divided arterial.	0.5	0.4
General Traffic Control			0.4 2.3
C) ARTERIAL ROADWAYS (Construction)			
Whitemud Freeway 34 Street - 50 Street	Construct the first two lanes of a four lane divided arterial.	1.6	1.5
91 Street Intersection	Complete interchange.	-	5.3
Castledowns Road Beaumaris Road - 97 Street	Complete the second half of a four lane divided arterial.	2.0	1.2
St. Albert Trail 137 Avenue - 156 Street	Reconstruct as a six lane divided arterial.	1.7	0.9

TABLE A-1 (Cont'd)

RECOMMENDED ROADWAY PROGRAM, 1984

(BASED UPON 1983 CONSTANT DOLLARS)

LINK	PROPOSED ROAD IMPROVEMENT	LENGTH (KM)	COST ($MILLION)
178 Street 95 Avenue - 100 Avenue	Complete the second half of a four lane divided arterial (developer cost)	1.0	0.5
50 Street 34 Avenue - Whitemud Freeway	Complete the second half of a four lane divided arterial.	2.4	1.5
23 Avenue 105 Street - Calgary Trail	Complete the second half of a four lane divided arterial.	0.7	0.5
Parsons Road - 66 Street	Complete the second half of a four lane divided arterial.	3.2	2.0
Calgary Trail - Parsons Road	Construct a four lane divided arterial.	0.9	1.5
34 Street Whitemud Freeway - Sherwood Park Freeway	Pave a two lane rural arterial.	3.5	1.5
Rowland Road 96 Street - 79 Street	Design and commence reconstruction to a four lane divided arterial.	2.0	0.3
91 Street 23 Avenue - Millwoods Road	Commence construction of the second half of a four lane divided arterial.	2.5	0.1
66 Street 23 Avenue - 34 Avenue	Construct the second half of a four lane divided arterial.	0.8	0.8
Calgary Trail 23 Avenue - 34 Avenue	Construct a new three lane arterial, southbound.	1.6	3.0
79 Avenue 170 Street Intersection	Commence construction of an at-grade interchange.	-	0.5

TABLE A-1 (Cont'd)

RECOMMENDED ROADWAY PROGRAM, 1984

(BASED UPON 1983 CONSTANT DOLLARS)

LINK	PROPOSED ROAD IMPROVEMENT	LENGTH (KM)	COST ($MILLION)
28 Avenue Millwoods Road - Lakewood Road E	Construct the second half of a four lane divided arterial.	0.4	0.4
			21.5
D) OTHER PROGRAMS			
Total Cost of Other Engineering Department Capital Programs			22.1
TOTAL COST OF ROADWAY PROGRAM, 1984 CONSTANT DOLLARS			57.3
CURRENT DOLLARS			(60.2)

TABLE A-2

RECOMMENDED ROADWAY PROGRAM, 1985

(BASED UPON 1983 CONSTANT DOLLARS)

LINK	PROPOSED ROAD IMPROVEMENT	LENGTH (KM)	COST ($MILLION)
A) MAJOR CONTINUOUS CORRIDOR			
Yellowhead Trail Clover Bar Bridge	Complete new three lane westbound bridge.	-	9.8
82 Street Intersection	Commence construction of an interchange.	-	6.6
			16.4
B) TRANSPORTATION SYSTEM MANAGEMENT			
106/107 Avenue 117 Street - 97 Street	Implement one-way couplet system.	2.3	0.6
116 Street 104 Avenue - 108 Avenue	Widen to a four lane divided arterial.	0.7	0.7
72 Avenue 114 Street Intersection	Right turn channelization.	-	0.2
114 Avenue Groad Road Intersection	North/South left turn bays.	-	0.4
			1.9
General Traffic Control			0.4
			2.3
C) ARTERIAL ROADWAYS			
156 Street 128 Avenue - 137 Avenue	Construct the second half of a four lane divided arterial.	2.1	0.9
170 Street 79 Avenue - 87 Avenue	Construct two lanes to complete a six lane divided arterial.	1.0	0.7
105 Avenue - Yellowhead Trail	Construct two lanes to complete a six lane divided aterial.	3.0	1.6

TABLE A-2 (Cont'd)

RECOMMENDED ROADWAY PROGRAM, 1985

(BASED UPON 1983 CONSTANT DOLLARS)

LINK	PROPOSED ROAD IMPROVEMENT	LENGTH (KM)	COST ($MILLION)
95 Avenue 170 Street - 178 Street	Construct a four lane divided arterial (developer cost)	1.1	1.7
Rowland Road Alex Taylor Road - 95 Street	Complete reconstruction to a four lane divided aterial.	-	1.1
Calgary Trail 23 Avenue - 34 Avenue	Reconstruct three northbound lanes.	1.6	0.6
91 Street 23 Avenue - Millwoods Road	Complete the second half of a four lane divided arterial.	2.2	1.6
17 Street Mapleridge Park - Sherwood Park Freeway	Pave a two lane rural arterial.	2.2	0.8
34 Avenue Calgary Trail - 111 Street	Construct the second half of a four lane divided arterial.	1.7	0.9
34 Street - 48 Street	Construct the first half of a four lane divided arterial.	1.6	0.5
34 Street 40 Avenue - Whitemud Freeway	Construct the first half of a four lane divided arterial.	0.7	0.9
137 Avenue St. Albert Trail - 156 Street	Reconstruct to a four lane divided arterial.	1.0	0.9
140 Street - St. Albert Trail	Construct two lanes to complete a six lane divided arterial.	0.9	0.4
Whitemud Freeway 156 Street - 170 Street	Design and commence reconstruction to a four lane divided arterial.	1.6	0.3
50 Street Intersection	Commence construction of an interchange.	-	4.3

TABLE A-2 (Cont'd)

RECOMMENDED ROADWAY PROGRAM, 1985

(BASED UPON 1983 CONSTANT DOLLARS)

LINK	PROPOSED ROAD IMPROVEMENT	LENGTH (KM)	COST ($MILLION)
53 Avenue - Fox Drive	Construct two lanes to complete a six lane divided arterial.	1.5	0.8
79 Avenue 170 Street Intersection	Complete construction of an at-grade interchange. Commence construction of interchange structures.	-	3.6
149 Street - 159 Street	Design and commence widening to a six lane freeway.	1.3	0.3
178 Street - Winterburn Road	Design and commence reconstruction to a two lane rural arterial.	2.3	0.2
184 Street 100 Avenue - Yellowhead Trail	Construct the first half of a four lane divided arterial.	3.3	2.5
			24.6

D) OTHER PROGRAMS

Total Cost of Other Engineering Department Capital Programs	17.7
TOTAL COST OF ROADWAY PROGRAM, 1985	
CONSTANT DOLLARS	61.0
CURRENT DOLLARS	(67.2)

TABLE A-3

RECOMMENDED ROADWAY PROGRAM, 1986-1988

(BASED UPON 1983 CONSTANT DOLLARS)

LINK	PROPOSED ROAD IMPROVEMENT	LENGTH (KM)	COST ($MILLION)
A) MAJOR CONTINUOUS CORRIDOR			
Yellowhead Trail			
82 Street Intersection	Complete construction of an interchange.	-	10.0
97 Street - 107 Street	Construct two lanes to complete a six lane divided arterial.	0.8	2.4
149 Street - 156 Street	Construct two lanes to complete a six lane divided arterial.	1.0	0.8
50 Street Intersection	Construct an interchange.	-	8.0
50 Street - 82 Street	Construct two lanes to complete a six lane divided arterial.	3.7	2.5
127 Street Intersection	Commence construction of an interchange.	-	6.1
			29.8
Outer Ring Road			
Land Acquisition		-	15.0
79 Avenue - Yellowhead Trail	Construct a two lane rural highway and railway overpass at CNR mainline.	6.72	8.4
Calgary Trail Intersection	Commence construction of railway underpass/interchange.	-	5.1
			28.5
SUBTOTAL, MAJOR CONTINUOUS CORRIDOR			58.3
B) TRANSPORTATION SYSTEMS MANAGEMENT			
111 Avenue Groat Road Intersection	Reconstruct as a signalized traffic circle.	-	2.1
63 Avenue 97 Street Intersection	East/West left turn bays.	-	0.5

TABLE A-3 (Cont'd)

RECOMMENDED ROADWAY PROGRAM, 1986-1988

(BASED UPON 1983 CONSTANT DOLLARS)

LINK	PROPOSED ROAD IMPROVEMENT	LENGTH (KM)	COST ($MILLION)
Stony Plain Road 105 Street - 127 Street	Construct and implement tidal flow system.	2.8	4.8 7.4
C) ARTERIAL PROGRAM			
111 Avenue 170 Street - 184 Street	Construct the first half of a four lane divided arterial.	1.4	2.3
170 Street - Mayfield Road	Reconstruct to a four lane divided arterial	0.8	2.2
34 Street 34 Avenue - 40 Avenue	Construct the first half of a four lane divided arterial.	1.4	1.1
34 Avenue 34 Street - Millwoods Road East	Construct the first half of a four lane divided arterial.	0.4	0.5
66 Street - 91 Street	Complete the second half of a four lane divided arterial.	2.0	1.5
Rowland Road 84 Street - 95 Street	Reconstruct Dawson bridge and approaches to a four lane divided arterial.	2.4	14.4
23 Avenue 105 Street - 111 Street	Complete the second half of a four lane divided arterial.	0.9	0.9
111 Street 23 Avenue - 30 Avenue	Complete the second half of a four lane divided aterial.	0.8	0.8
23 Avenue - 19 Avenue	Construct the first half of a four lane divided arterial.	0.6	0.8
43 Avenue - 61 Avenue	Construct two lanes to complete a six lane divided arterial.	2.1	1.5

TABLE A-3 (Cont'd)

RECOMMENDED ROADWAY PROGRAM, 1986-1988

(BASED UPON 1983 CONSTANT DOLLARS)

LINK	PROPOSED ROAD IMPROVEMENT	LENGTH (KM)	COST ($MILLION)
Ellerslie Road			
Highway #2 - 91 Street	Construct the first two lanes of a four lane divided arterial.	0.8	0.7
Highway #2 Intersection	Channelize intersection.	-	0.8
137 Avenue			
156 Street - 170 Street	Complete reconstruction to a four lane divided arterial.	1.6	1.0
79 Avenue			
170 Street Intersection	Complete construction of an interchange.	-	3.4
178 Street - Winterburn	Reconstruct to a two lane rural arterial.	2.3	1.2
178 Street Intersection	Construct an at-grade interchange.	-	0.8
Keillor Road			
Fox Drive - Saskatchewan Drive	Reconstruct and pave a two lane rural arterial. Construct a new access to Fort Edmonton Park.	1.8	2.7
149 Street			
125 Avenue - 128 Avenue	Construct the second half of a four lane divided arterial.	0.5	0.3
128 Avenue - 137 Avenue	Construct the first half of a four lane divided arterial.	1.6	1.7
62 Avenue			
178 Avenue - 184 Avenue	Construct the first half of a a four lane divided arterial.	0.8	0.6
170 Street - 178 Street	Complete the second half of a four lane divided arterial.	0.9	0.8
Whitemud Freeway			
122 Street Intersection	Construct an at-grade interchange.	-	0.9

TABLE A-3 (Cont'd)

RECOMMENDED ROADWAY PROGRAM, 1986-1988

(BASED UPON 1983 CONSTANT DOLLARS)

LINK	PROPOSED ROAD IMPROVEMENT	LENGTH (KM)	COST ($MILLION)
50 Street - 34 Street	Construct the second half of a four lane divided arterial.	1.6	0.6
50 Street Intersection	Complete construction of an interchange.	-	1.0
149 Street - 159 Street	Construct two lanes to complete a six lane divided arterial.	1.3	2.8
111 Street Intersection	Construct an at-grade interchange.	-	1.0
113A Street Castledowns Road - 175 Avenue	Construct the first half of a four lane divided arterial.	1.4	1.6
112 Avenue 82 Street Intersection	Add one westbound lane.	-	0.8
167 Avenue 82 Street - 91 Street	Construct the first half of a four lane divided arterial.	0.9	0.9
113A Street 127 Street	Construct the first half of a four lane divided arterial.	1.7	1.7
127 Street 153 Avenue - 167 Avenue	Pave a two lane rural arterial.	1.6	1.3
82 Street 149 Avenue - 167 Avenue	Complete the second half of a four lane divided arterial.	2.0	1.8
170 Street 62 Street - 69 Avenue	Complete the second half of a four lane divided arterial.	0.8	0.7
137 Avenue - Yellowhead Trail	Reconstruct as a four lane divided arterial.	2.8	4.8

TABLE A-3 (Cont'd)

RECOMMENDED ROADWAY PROGRAM, 1986-1988

(BASED UPON 1983 CONSTANT DOLLARS)

LINK	PROPOSED ROAD IMPROVEMENT	LENGTH (KM)	COST ($MILLION)
Terwillegar Drive 34 Avenue - 40 Avenue	Construct the first half of a four lane divided arterial. (developer cost)	1.3	1.3
107 Avenue 163 Street - 170 Street	Reconstruct to a four lane divided roadway with channelization at Mayfield Road intersection.	0.9	0.9
114 Street 72 Avenue - University Avenue	Reconstruct to a five lane undivided arterial and implement lane control.	1.0	4.0
			65.6
D) OTHER PROGRAMS			
Total Cost of Other Engineering Department Capital Programs			52.0
TOTAL COST OF ROADWAY PROGRAM, 1986 - 1988			
CONSTANT DOLLARS			183.3
CURRENT DOLLARS			(221.1)

TABLE A-4

RECOMMENDED ROADWAY PROGRAM, 1989 - 1993

(BASED UPON 1983 CONSTANT DOLLARS)

LINK	PROPOSED ROAD IMPROVEMENT	LENGTH (KM)	COST ($MILLION)
A) MAJOR CONTINUOUS CORRIDOR			
Yellowhead Trail 127 Street Intersection	Construct an interchange.	-	11.2
184 Street Intersection	Construct an interchange.	-	7.2
Outer Ring Road Intersection	Construct an interchange.	-	7.2
Winterburn Road Intersection	Construct an interchange.	-	7.2
Capilano Freeway Extension Intersection	Construct an intersection.	-	1.0
119 Street Intersection	Construct an intersection.	-	1.0
			34.8
Outer Ring Road Calgary Trail Intersection	Complete the construction of an interchange and railway underpass.	-	9.2
91 Street - 111 Street	Construct a two lane rural highway.	2.3	5.7
62 Avenue - 79 Avenue	Construct a two lane rural highway.	2.0	1.8
111 Avenue - Terwillegar Drive	Construct a two lane rural highway.	5.3	6.1
91 Street - 50 Street	Construct a two lane rural highway.	3.3	2.7
Terwillegar Drive - 62 Avenue	Construct a two lane rural highway.	7.2	5.1
	Construct a three lane river bridge and approaches.	-	16.0

TABLE A-4 (Cont'd)

RECOMMENDED ROADWAY PROGRAM, 1989 - 1993

(BASED UPON 1983 CONSTANT DOLLARS)

LINK	PROPOSED ROAD IMPROVEMENT	LENGTH (KM)	COST ($MILLION)
79 Avenue - Highway #16	Construct the second half of a four lane divided rural highway.	3.2	2.2
50 Street - Highway #14	Commence construction of a two a two lane rural highway including a four lane railway overpass.	6.2	12.4
			61.2
SUBTOTAL, MAJOR CONTINUOUS CORRIDOR			96.0
B) TRANSPORTATION SYSTEMS MANAGEMENT			
107 Avenue 142 Street Intersection	Construct a signalized traffic circle.	-	1.4
Connors Road 90 Avenue - 95 Avenue	Implement a lane control system.	2.0	0.6
95 Avenue - Scona Road	Construct an additional lane to provide an exclusive bus lane.	-	3.0
Bonnie Doon Circle	Construct a signalized traffic circle.	-	1.5
118 Avenue 101 Street Intersection	Contruct a channelized intersection.	-	0.6
97 Avenue 103 Street - 104 Street	Construct an at-grade interchange.	0.2	1.0
106/107 Avenue 97 Street - 95 Street	Implement a one-way couplet.	0.6	0.4
100 Avenue/Victoria Park Road Groat Road - 109 Street	Implement a lane control system.	2.0	0.5

TABLE A-4 (Cont'd)

RECOMMENDED ROADWAY PROGRAM, 1989 - 1993

(BASED UPON 1983 CONSTANT DOLLARS)

LINK	PROPOSED ROAD IMPROVEMENT	LENGTH (KM)	COST ($MILLION)
Kingsway Avenue 127 Street - 101 Street	Implement a bus lane corridor.	3.7	0.5
			8.1
General Traffic Control Systems			3.5
			13.0
C) ARTERIAL ROADWAYS CONSTRUCTION			
Groat Road	Reconstruct bridge and approaches to provide a six lane river crossing.	-	10.5
127 Street 139 Avenue - 145 Avenue	Construct the second half of a four lane divided arterial.	0.7	1.0
107 Avenue 135 Street - 142 Street	Construct two lanes to complete a six lane undivided arterial.	0.7	0.5
Roper Road 68 Street - 75 Street	Contruct a four lane divided arterial.	0.7	1.1
95 Avenue 189 Street - Outer Ring Road	Construct the first half of a four lane undivided arterial.	1.0	0.6
91 Street 23 Avenue - Ellerslie Road	Construct the first half of a four lane divided rural arterial.	3.0	2.0
17 Street 34 Avenue - Whitemud Freeway	Construct the first half of a four lane divided arterial.	1.6	1.4
Whitemud Freeway - Mapleridge Park	Construct the first half of a four lane divided arterial.	1.6	1.4
111 Avenue 184 Street - Outer Ring Road	Construct the first half of a four lane divided arterial.	1.4	1.3
34 Avenue 50 Street - 66 Street	Construct the second half of a four lane divided arterial.	1.1	0.8

TABLE A-4 (Cont'd)

RECOMMENDED ROADWAY PROGRAM, 1989 - 1993

(BASED UPON 1983 CONSTANT DOLLARS)

LINK	PROPOSED ROAD IMPROVEMENT	LENGTH (KM)	COST ($MILLION)
137 Avenue 97 Street Intersection	Construct an at-grade interchange.	-	0.9
Whitemud Freeway 34 Street - Highway #14	Contruct a two lane rural highway.	3.4	2.4
34 Street 23 Avenue - 34 Avenue	Construct the first half of a four lane divided arterial.	1.0	0.9
23 Avenue 17 Street - 34 Street	Construct the first half of a four lane divided arterial.	1.6	1.4
111 Street 19 Avenue - Outer Ring Road	Construct the first half of a four lane divided arterial.	1.5	1.4
	Blackmud Creek Bridge (six lanes)	-	5.0
62 Avenue 184 Street - Outer Ring Road	Construct the first half of a four lane divided arterial.	1.4	1.3
153 Avenue 127 Street - 142 Street	Construct the first half of a four lane divided arterial.	1.6	1.5
66 Street 13 Avenue - Ellerslie Road	Construct the first half of a four lane divided arterial.	1.9	1.7
127 Street 145 Avenue - 160 Avenue	Construct the second half of a four lane divided arterial.	1.9	1.7
153 Avenue 66 Street - 82 Street	Construct the first half of a four lane divided arterial.	1.6	1.4
113A Street Castledowns Road - 167 Avenue	Construct the second half of a four lane divided arterial.	0.5	0.5

TABLE A-4 (Cont'd)

RECOMMENDED ROADWAY PROGRAM, 1989 - 1993

(BASED UPON 1983 CONSTANT DOLLARS)

LINK	PROPOSED ROAD IMPROVEMENT	LENGTH (KM)	COST ($MILLION)
66 Street 149 Avenue - 160 Avenue	Construct the first half of a four lane divided arterial.	1.4	1.2
111 Avenue 170 Street - 184 Street	Construct the second half of a four lane divided arterial.	1.6	1.4
Terwillegar Drive 35 Avenue - Outer Ring Road	Construct the first half of a four lane divided arterial.	2.2	2.0
Whitemud Freeway 111 Street Intersection	Construct an interchange.	-	8.0
106 Street Interchange	Construct an overpass.	-	4.2
Calgary Trail - 99 Street	Commence construction of an interchange.	-	8.0
66 Street Millwoods Roads - 23 Avenue	Construct the second half of a four lane divided arterial.	0.8	0.7
50 Street 34 Avenue - Millwoods Road S	Construct the second half of a four lane divided arterial.	2.1	1.9
34 Avenue 50 Street - 34 Street	Construct the second half of a four lane divided arterial.	1.7	1.6
153 Avenue 97 Street - 127 Street	Construct the second half of a four lane divided arterial.	3.4	3.0
82 Street - 97 Street	Construct the second half of a four lane divided arterial.	1.6	1.4
113A Street 174 Avenue - North Castledowns	Construct the first half of a four lane divided arterial.	0.8	0.7

TABLE A-4 (Cont'd)

RECOMMENDED ROADWAY PROGRAM, 1989 - 1993

(BASED UPON 1983 CONSTANT DOLLARS)

LINK	PROPOSED ROAD IMPROVEMENT	LENGTH (KM)	COST ($MILLION)
167 Avenue 91 Street - 97 Street	Construct the second half of a four lane divided arterial.	0.7	0.6
119 Street Yellowhead Trail - 107 Avenue	Reconstruct to a four lane divided arterial.	3.3	5.8
184 Street Highway #16 - Yellowhead Trail	Construct the second half of a four lane divided arterial.	3.2	2.9
95 Avenue Outer Ring Road - Lewis Farm Access	Construct the first half of a four lane undivided arterial.	1.0	0.8
82 Street 167 Avenue - 175 Avenue	Construct the first half of a four lane divided arterial.	0.7	0.8
91 Street Ellerslie Road - Highway #2	Commence construction of a two lane rural highway.	2.6	1.5
82 Street 153 Avenue - 160 Avenue	Construct the second half of a four lane divided arterial.	0.7	0.6
34 Street Sherwood Park Freeway - Whitemud Freeway	Reconstruct to a four lane divided arterial.	3.4	6.0

D) OTHER PROGRAMS

Total Cost of Other Engineering Department Capital Programs.	85.4 93.8
TOTAL COST OF ROADWAY PROGRAM, 1989 - 1993	
CONSTANT DOLLARS	288.2
CURRENT DOLLARS	(419.3)

TABLE A-5

PROJECTS NOT COMPLETED AT END OF 1993

DUE TO FINANCIAL CONSTRAINTS

(COSTS IN 1983 CONSTANT DOLLARS)

LINK	PROPOSED ROAD IMPROVEMENT	LENGTH (KM)	COST ($MILLION)
91 Street Ellerslie Road - Highway #2	Complete construction of a two lane rural highway.	2.6	1.0
	Construct a railway underpass and interchange.		10.2
34 Avenue - Whitemud Freeway	Construct two lanes to complete a six lane rural arterial.	2.0	1.1
Whitemud Freeway Calgary Trail - 99 Street	Complete construction of an interchange.	-	3.5
	Construct a railway underpass.	-	6.0
122 Street Intersection	Cnstruct an interchange.	-	6.0
111 Avenue - 122 Street	Reconstruct to a four lane divided depressed freeway.	1.6	4.2
CNR Crossing - E 17 Street	Construct a four lane divided railway underpass.	-	6.0
Outer Ring Road 50 Street - Highway #14	Complete construction of a two lane rural highway, including a railway overpass.	6.2	3.2
Capilano Road 120 Avenue - Yellowhead Trail	Construct a four lane divided arterial, including a railway underpass.	0.8	11.0
28 Avenue 91 Street - 50 Street	Construct the second half of a four lane divided arterial.	3.2	2.9

TABLE A-5 (Cont'd)

PROJECTS NOT COMPLETED AT END OF 1993

DUE TO FINANCIAL CONSTRAINTS

(COSTS IN 1983 CONSTANT DOLLARS)

LINK	PROPOSED ROAD IMPROVEMENT	LENGTH (KM)	COST ($MILLION)
Roper Road 34 Street - 50 Street	Construct a four lane divided arterial.	1.6	2.9
Ellerslie Road Highway #2 - 91 Street	Construct the second half of a four lane divided arterial.	1.8	3.1
91 Street - 50 Street	Pave a two lane rural arterial.	3.3	2.4
Highway #2 Intersection	Construct an interchange. Construct a railway underpass.	- -	7.2 6.0
23 Avenue Terwillegar Drive - 119 Street	Construct the first half of a four lane divided arterial.	3.7	3.2
111 Street - 119 Street	Construct the second half of a four lane divided arterial.	0.6	0.5
87 Avenue 189 Street - Lewis Farms Access	Construct the first half of a four lane divided arterial.	2.0	1.8
100 Avenue 147 Street - 170 Street	Construct the first half of a four lane divided arterial.	2.8	7.7
CPR Overpass W 109 Street	Reconstruct existing overpass.	-	5.0
137 Avenue 127 Street - 140 Street	Construct two lanes to complete a six lane divided arterial.	1.6	1.3
170 Street - 184 Street	Construct the first half of a four lane divided rural arterial.	1.7	1.1
184 Street Yellowhead Trail - 137 Avenue	Construct the first half of a four lane divided rural arterial.		

TABLE A-5 (Cont'd)

PROJECTS NOT COMPLETED AT END OF 1993

DUE TO FINANCIAL CONSTRAINTS

(COSTS IN 1983 CONSTANT DOLLARS)

LINK	PROPOSED ROAD IMPROVEMENT	LENGTH (KM)	COST ($MILLION)
149 Street 128 Avenue - 137 Avenue	Construct the second half of a four lane divided arterial.	1.6	1.9
167 Avenue 82 Street - 66 Street	Construct the first half of a four lane divided arterial.	1.6	1.6
91 Street - 82 Street	Construct the second half of a four lane divided arterial.	0.9	0.7
66 Street 160 Avenue - 167 Avenue	Construct the first half of a four lane divided arterial.	0.8	0.7
82 Street 160 - 167 Avenue	Construct the second half of a four lane divided arterial.	0.8	0.7
CNR Underpass N Yellowhead Trail	Widen to a six lane railway underpass.	-	2.0
111 Street 23 Avenue - 19 Avenue	Construct the second half of a four lane divided arterial.	1.2	1.3
142 Street 153 Avenue - St. Albert City Limit	Pave a two lane rural arterial.	1.9	1.2
99 Avenue CPR Overpass W 109 Street	Reconstruct existing overpass.	-	4.0
Fort Road CNR Underpass N Yellowhead Trail	Reconstruct underpass to a four lane divided arterial.	-	7.0

TABLE A-5 (Cont'd)

PROJECTS NOT COMPLETED AT END OF 1993

DUE TO FINANCIAL CONSTRAINTS

(COSTS IN 1983 CONSTANT DOLLARS)

LINK	PROPOSED ROAD IMPROVEMENT	LENGTH (KM)	COST ($MILLION)
50 Street CNR Crossing N Yellowhead Trail	Construct a six lane divided railway underpass.	-	6.0
156 Street CNR Crossing N Yellowhead Trail	Construct a four lane divided railway underpass.	-	6.0
TOTAL COST OF PROJECTS NOT COMPLETED CONSTANT DOLLARS			138.4

APPENDIX 3

TRANSIT CAPITAL PROGRAM

1984 - 1993

TABLE A-6

UNIT CONSTRUCTION COST ESTIMATES (1983)

ROAD TYPE	COST PER KILOMETRE*
4 Lane Divided Urban Arterial	$1,470,000.00
4 Lane Undivided Urban Arterial	1,290,000.00
4 Lane Divided Rural Arterial	1,080,000.00
2 Lane Urban Arterial	740,000.00
2 Lane Rural Arterial	540,000.00

*Cost does not include land purchase or major utility relocation.

LAND COST

Outer Ring Road	Add 30% to Construction Cost
Other Arterials Where Land Ownership is Uncertain	Add 20% to Construction Cost
Lot Purchase (where land ownership is certain)	$100,000 per Residential Lot
	$200,000 per acre of Industrial Land
	$50,000 per Acre of Unserviced Land

STRUCTURAL COSTS

Bridge	$1,300/sq.metre
Retaining Wall	$1,000/metre for a 3m Retaining Wall

APPENDIX 3

TRANSIT CAPITAL PROGRAM

(1984 - 1993)

TABLE A-7

RECOMMENDED TRANSIT CAPITAL PROGRAM, 1984

(BASED ON 1983 CONSTANT DOLLARS)

	PROGRAM	PROPOSED IMPROVEMENT	COST ($ MILLION)
A.	LIGHT RAIL TRANSIT		
	Corona Station to Government Centre	Commence construction of a single track LRT tunnel.	10.0
			10.0
B.	BUS TRANSIT		
	Terminal Improvements Trolley Line Extensions Plant and Equipment Maintenance Projects		3.5
			3.5
	TOTAL COST OF TRANSIT CAPITAL PROGRAM, 1984		
	CONSTANT DOLLARS		13.5
	CURRENT DOLLARS		14.2

PRELIMINARY MAJOR BUS TRANSIT IMPROVEMENTS PROJECTS

1984 - 1988

TERMINAL IMPROVEMENTS

Northgate	Construct a bus terminal.
Davies	Construct a bus terminal.
Castledowns	Construct a bus shelter.
Kaskitayo	Construct a bus shelter.
Belvedere	Construct a pedestrian overpass.
Jasper Place	Reconstruct terminal and bus shelters.

TROLLEY LINE EXTENSIONS

West Jasper Place Extension	Extend trolley wire from Jasper Place to West Jasper Place terminal via 156 Street and 87 Avenue.
Northgate Extension	Extend trolley wire from 118 Avenue - 101 Street to Northgate terminal via 118 Avenue and 97 Street.
Abbotsfield Extension	Extend trolley wire from 118 Avenue - 50 Street to Abbotsfield terminal via 118 Avenue.

TABLE A-8

RECOMMENDED TRANSIT CAPITAL PROGRAM, 1985

(BASED ON 1983 CONSTANT DOLLARS)

PROGRAM	PROPOSED IMPROVEMENT	COST ($ MILLION)
A. LIGHT RAIL TRANSIT		
Corona Station to Government Centre	Continue construction of two track LRT tunnel.	15.0
University of Alberta to University of Alberta Farm.	Commence engineering and land acquisitions.	5.0
		20.0
B. BUS TRANSIT		
Terminal Improvements Trolley Line Extensions Plant and Equipment Maintenance Projects		3.5
		3.5
TOTAL COST OF TRANSIT CAPITAL PROGRAM, 1985		
CONSTANT DOLLARS		23.5
CURRENT DOLLARS		25.9

TABLE A-9

RECOMMENDED TRANSIT CAPITAL PROGRAM, 1986 - 1988

(BASED ON 1983 CONSTANT DOLLARS)

	PROGRAM	PROPOSED IMPROVEMENT	COST ($ MILLION)
A.	LIGHT RAIL TRANSIT		
	Corona Station to University of Alberta	Complete construction of a single track LRT tunnel, bridge and stations.	60.0
	University of Alberta to U. of A. Farm	Commence construction of a single track LRT line.	10.0
			70.0
B.	BUS TRANSIT		
	Terminal Improvements Trolley Line Extensions Plant and Equipment Maintenance Projects		10.5
			10.5
	TOTAL COST OF TRANSIT CAPITAL PROGRAM, 1986 - 1988		
	CONSTANT DOLLARS		80.5
	CURRENT DOLLARS		98.1

TABLE A-10

RECOMMENDED TRANSIT CAPITAL PROGRAM, 1989 - 1993

(BASED ON 1983 CONSTANT DOLLARS)

	PROGRAM	PROPOSED IMPROVEMENT	COST ($ MILLION)
A.	LIGHT RAIL TRANSIT		
	University of Alberta to U. of A. Farm	Complete construction of a single track LRT line, with stations.	15.0
	Northeast Line	Upgrade stations to accommodate four car LRT trains.	5.0
	Belvedere Station	Provide pedestrian tunnel from bus terminal to LRT platform.	3.0
	Clareview Station	Construct ultimate station, and connections to town centre.	8.0
	D.L. MacDonald LRT Garage	Expand garage to accommodate additional LRT cars.	3.0
	LRT Cars	12 LRT cars.	18.0
			52.0
B.	BUS TRANSIT		
	Terminal Improvements Trolley Line Extensions Plant and Equipment Maintenance Projects		86.4
			86.4
	TOTAL COST OF TRANSIT CAPITAL PROGRAM, 1989 - 1993		
	CONSTANT DOLLARS		138.4
	CURRENT DOLLARS		206.7

PRELIMINARY MAJOR BUS TRANSIT IMPROVEMENTS PROJECTS

1989 - 1993

TERMINAL IMPROVEMENTS

University of Alberta Farm	Construct a major bus teminal, access roads.
Lakes District	Construct a bus terminal.
Meadows	Construct a bus terminal.
Kingsway	Ugrade existing bus terminal.
Northwest	Construct a bus terminal.
Terwillegar/Riverbend	Construct a bus terminal.

TROLLEY LINE EXTENSIONS

Bonnie Doon to University of Alberta	Extend trolley overhead from 89 Avenue - 114 Street to Bonnie Doon terminal via 82 Avenue.
Low Level Bridge	Extend trolley wire from 100 Street - 102 Avenue to 82 Avenue - 99 Street via Low Level Bridge.

PLANT AND EQUIPMENT MAINTENANCE

Diesel Buses	86 Articulated Buses
Trolley Buses	50 Articulated Trolleys

GARAGES

Northeast bus Garage

TABLE A-10

PROJECTS NOT COMPLETED AT END OF 1993

DUE TO FINANCIAL CONSTRAINTS

(COSTS IN 1983 CONSTANT DOLLARS)

		COST ($ MILLION)
A.	LIGHT RAIL TRANSIT	
	Twin South LRT between Corona Station and the University Farm.	50.0
B.	BUS TRANSIT	
	Terminal Improvements Trolley Line Extensions Plant and Equipment Maintenance Projects	27.0
	TOTAL COST OF PROJECT NOT COMPLETED CONSTANT DOLLARS	77.0

POOR

QUALITY

ORIGINAL